FACT SHEET FOR STATE WASTE DISCHARGE PERMIT ST-5273

Western Polymer

SUMMARY

Western Polymer Corporation owns and operates a potato starch processing and recycling facility that produces a chemically altered dry starch product that is used in the paper producing industry. Process wastewater is produced year around and is land applied to approximately 330 acres during the growing season. Wastewater produced during the winter is stored in a lined impoundment.

There will be no changes in the discharge limitations from the previous permit. The proposed permit will continue the requirement to monitor the irrigated wastewater, the ground water, soils, and the fresh irrigation water. Some additional testing will be required for the irrigated water and the soils.

The absence of water at the upgradient well precludes the determination of background ground water conditions and enforcement limits. Trends in the soil nitrogen and salt concentrations in the root zone will continue to be used to assess the operations of the site and the protection of the ground water. Additional reporting will be required in the annual irrigation and crop plan that includes a comparison of actual nitrogen, salt and water loads to estimated values that were determined the previous year based on the crops rotation.

TABLE OF CONTENTS

INTRODUCTION

This fact sheet is a companion document to the draft State Waste Discharge Permit No. **ST-5273** . The Department of Ecology (the Department) is proposing to issue this permit, which will allow discharge of wastewater to waters of the State of Washington. This fact sheet explains the nature of the proposed discharge, the Department's decisions on limiting the pollutants in the wastewater, and the regulatory and technical bases for those decisions.

Washington State law (RCW 90.48.080 and 90.48.162) requires that a permit be issued before discharge of wastewater to waters of the state is allowed. Regulations adopted by the state include procedures for issuing permits (Chapter 173-216 WAC), and water quality criteria for ground waters (Chapter 173-200 WAC). They also establish requirements which are to be included in the permit.

This fact sheet and draft permit are available for review by interested persons as described in Appendix A--Public Involvement Information.

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in these reviews have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Changes to the permit will be addressed in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	Western Polymer Corporation
Facility Name and Address	Western Polymer Corp. 32 Road "R" S.E. Moses Lake, WA 98837
Type of Facility	Potato starch processing and recycling
Type of Treatment:	Screening, settling, and land treatment
Facility Location	East of Moses Lake (Grant Co.); adjacent to Interstate 90; east of Road "Q" N.E. Latitude: 47° 05' 12" N Longitude: 119° 07' 05" W
Legal Description of Application Area	Approx 333 acres: S ½ Sec. 25, and N ½ Sec. 36, T. 19N, R. 29 EWM; N ½ Sec. 31, T. 19N, R. 30 EWM Latitude: 47° 06' 10" N Longitude: 119° 07' 32" W.
Contact at Facility	Name: Sheldon Townsend Telephone #: 509.765.1803
Responsible Official	Name: Sheldon Townsend Title: Co-Owner FAX: 509.765.0327

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

Western Polymer Corporation (WPC) owns and operates a potato starch processing and recycling facility located approximately six miles east of Moses Lake (Grant Co.); Fig. 1. Starch that is recovered from their waste streams by various potato processors is brought to the facility year around where a majority of it is processed into a dry product that is used in the paper industry to add strength to the paper and to make it easier for mills to substitute weaker recycled fiber for raw fiber.

The facility is located in the central region of the state and within the Federal Columbia Basin Irrigation Project that provides irrigation water to approximately 500,000 acres of production agriculture. The semi-arid region receives less than 10" of precipitation a year.

INDUSTRIAL PROCESSES

Approximately 40 million pounds per year of raw starch is trucked to the facility in a variety of forms (slurry; decant; cake; dried) depending on the transport distance. Water is added to the raw starch to bring the material to 6-7% dry solids for cleaning by screening. After cleaning the starch solids are mechanically concentrated to a 35-38% dry solid slurry.

The slurry is chemically treated to form either a modified cationic potato starch or a carboxymethyl starch that is used in the paper industry, or an unmodified industrial-grade potato starch. After chemical treatment the starch is neutralized with acid and sent to a vacuum filter to remove excess water. From the filter the material is sent to a flash dryer that raises the solids content to 83-87%. This material is sifted and packaged.

Process waste streams are predominately generated during cleaning of the raw starch, vacuum filtrate after chemical treatment, and drying. Information presented in the permit application shows a maximum daily discharge of approximately 132,000 gallons per day and an average monthly flow of approximately 97,000 gpd.

Process Chemicals

According to information given in the permit application, the following chemicals are used in the modified starch process:

Quat 188[1]	5,000,000 lbs	Sodium monochloroacetate	130,000 lbs
Hydrochloric acid	3,100,000 lbs	Sodium sulfate	96,000 lbs
Lime	1,800,00 lbs	Hydrogen peroxide	70,000 lbs
Caustic soda (NaOH)	900,000 lbs	Potassium monopersulfate	50,000 lbs
Cationic and Amphoteric Waxy Maize starch	450,000 lbs	Sodium sulfite	30,000 lbs

Sulfuric acid	170,000 lbs	Busan[2]	4000 lbs
[1] 3-chloro-2-hydroxypropyltrimethylammonium chloride [2] contains 19.8% 1,2-Benzoisothiazol-3(2H)-one			

The permit application notes that Epichlorohydrin is a contaminant in the Quat 188 at a concentration of <5 ppm. Epichlorohydrin is an organic used in the making of glycerin, plastics and other polymers. Certificates of analysis for the past two years have stated no detectable levels.

TREATMENT PROCESSES

The design of the process wastewater system was first done in 1995 (Esvelt Environmental Engineering, 1995). At that time, process wastewater was sent from the processing facility to unlined earthen settling ponds and a primary storage lagoon that were located approximately one mile north of the plant. The wastewater was blended with supplemental irrigation water and land applied year around onto 280 acres. The average flow from the processing facility to the pond was 364,000 gpd.

Elevated conductivity and cation/anion concentrations in the ground water at a downgradient well located near the unlined lagoon showed that the lagoon was impacting the ground water. An engineering report was submitted that described an upgrade to replace the unlined ponds/lagoons with lined structures; Cascade Earth Sciences, 1999. The upgrade included the construction of two concrete lined settling basins and two lined storage ponds. The ponds were located at the same site as the old unlined ponds. Construction was completed in the Fall of 2000. The average design flow from the facility was changed to 62,500 gpd. This reduced flow from the previous engineering report was the result of implementing water conservation measures at the processing facility.

After the upgrade was completed, process wastewater that is collected at the processing facility is pumped via an 8 inch PVC pipeline approximately one mile north to the pond/sprayfield system; Fig. 2. The water first enters the in-ground concrete settling basins which are operated in series and were constructed in a manner that allows the physical removal of solids. Water from the basins gravity flows to a two-celled 80-mil HDPE lined storage/irrigation pond with a volume of 14.55 MG. Water is pumped from the pond to the fields. Since the completion of the new ponds, the land application of process wastewater is now confined to the growing season.

The transmission pipeline from the processing facility crosses the E. Low Canal attached to a bridge structure. The crossing is double piped and constructed of stainless steel. This canal is a major supply canal for the federal irrigation project and provides supplemental irrigation water for the site.

SPRAYFIELD SYSTEM

Wastewater is pumped from the storage pond and applied during the growing season to approximately 330 acres via center pivot irrigation; Fig. 2. Handlines are used to irrigate the NC and NE fields. Wastewater sent to the center pivot fields is mixed with supplemental water from the E. Low Canal.

The sprayfields are not owned by WPC. Crop rotations generally include wheat, corn, and alfalfa.

Irrigated wastewater sampling

Samples of the irrigated wastewater have been taken at the pumphouse located adjacent to the storage pond as per permit requirements. It was discovered by the Permittee during the factual review of the draft of this Fact Sheet that this location is before supplemental irrigation water is added and mixed with the wastewater as required by the permit; 4:1 ratio. The supplemental irrigation water from the E. Low Canal is added to the wastewater stream at a manifold located just north of the pumphouse in field #4. The mixed water is then sent to the sprayfields. Therefore, all of the wastewater load values that have been reported to Ecology are overestimates of the actual values.

A solution to this sampling error is explained later in the Fact Sheet.

Nutrient and water loading

The annual irrigation and crop plan reports were reviewed for the 2000-2004 time period. Due to the sampling error previously explained, the following information does not include the 4:1 mix ratio of supplemental to wastewater.

A. Hydraulic Loading

	Wastewater Flow (ac-ft)	Crop Requirement (ac-ft)	Avg. Leaching Fraction (%)
2000	146	745	----
2001	63.7	690	----
2002	66.3	828	----
2003	65.2	859	20
2004	94.4	737	27

The volume of irrigated wastewater has been well below the crop requirements. A large amount of supplemental water is required to meet the crop demand. The large decrease in 2001 was due to the implementation of water conservation measures in the processing facility. The increased flow in 2004 was due to production increases.

The leaching fraction (LF) represents the percent of the total net water that was applied to the fields in excess of the crop water requirement. The reported high LF values were associated with extremely high values for specific fields. In 2003 the LF for field 5A was approximately 50% and the value for field 2 in 2004 was 79%; i.e., seventy-nine percent of the net water applied to field 2 in 2004 leached beyond the root zone to the ground water.

B. Nitrogen Loading

	Avg. total net load [1] (lbs/acre)	Avg. balance [2] (lbs/acre)
2000	89	-126
2001	131	-140
2002	87	-95
2003	128	-107
2004	173	56

[1] Wastewater + commercial fertilizer. Includes 35% volatilization loss from process wastewater and 15% loss from fertilizer.

[2] N applied (wastewater + fertilizer) less N removed in harvest. Negative values mean N load less than crop uptake

Values for nitrogen loading from the wastewater and commercial fertilizer, crop harvest data, and nitrogen losses via volatilization were taken from the annual irrigation and crop plan reports to estimate the nitrogen balance for the site (Addendum).

The net nitrogen loading to the site has generally been less than crop requirements. Nitrogen loading appears to be on an increasing trend since 2002.

C. Salt Loading

	Avg. salt load (lbs/acre)	Avg balance[1] (lbs/acre)
2000	8600 (IDS)	8000
2001	4600 (IDS)	4000
2002	3600 (IDS)	3200
2003	2600 (FDS)	2100
2004	8700 (FDS)	8500

[1] Salt applied less removed by harvest. Positive values indicate load in excess of crop uptake

Salt load values were compiled from the annual irrigation and crop plans (Addendum). Values for 2000-2002 represent "total dissolved solids" loading while the 2003-04 values represent "fixed dissolved solids" which, given the high organic strength of the wastewater, more accurately describes the salt loading.

The chemicals used in the processing of the starch result in a high salt load to the sprayfields. Chloride is the predominate contributor to the salt load. Average chloride load values (2000-2004) ranged from 650 to approximately 4600 lbs/acre.

Sodium load values increased substantially in 2004. Values from 2000 – 2003 ranged from 102 to 280 lbs/acre. The 2004 load was 714 lbs/acre. The increased effluent sodium concentration and sprayfield load in 2004 changed the Ca:Na ratio of the wastewater from what had been a value of 6:1 to a lower value of 1.3:1. The higher ratio helped to keep the calcium level in the soils high resulting in better soil structure and drainage.

D. BOD Loading

Values reported in the monthly DMRs ranged from less than zero to approximately 8900 lbs/day, with an average of 2266 lbs/day (Addendum). Based on a 245 day irrigation season (Mar-Oct) and 333 acres, the average load to the fields is 1667 lbs/acre. This is within the range of estimated design loads for the system (1591-1873 lbs/acre; CES, 1999).

Soils

The annual irrigation and crop plans have reported a trend analysis for selected parameters in the upper (1-3 ft) and lower (4-6 ft) soils in the sprayfields. The latest trend information is for the period November 1996 – November 2004 (Soiltest Farm Consultants, 2005). Using the soil test data (Spring and Fall) to monitor the irrigation management of the site and insure that the ground water is being protected is done in response to recommendations made for the design of the site (Esvelt Environmental Engineering, 1995; Cascade Earth Sciences, 1999).

Nitrate: Since the facility upgrades in late 2000 and the subsequent elimination of winter application of wastewater, the nitrate level in the surface soils show a slight decline while the lower soils show a slight increase. There is variability in the soil nitrate levels at all fields which reflect the different nitrogen loading and crop rotation.

Salinity: While there is variability in the soil salinity, there is a decreasing trend in the surface soils and a corresponding increasing trend in the lower soils. Soluble salt values in the surface soils in 2004 were approximately 5 mmhos/cm while the lower soils were approximately 10 mmhos/cm. The irrigation of the site is managed for a value of $\leq$2.5 mmho/cm to control soil salinity.

Exchangeable Sodium Percentage (ESP): This parameter shows the percentage of sodium on the exchange sites on soil particles compared to the total exchangeable cations. A value >15% indicates sodic conditions and soils tending to have poor drainage due to poor soil structure. There has been a slight increase in the ESP of the surface soils (1ft) since 1996. Values have increased from approximately 3% in 1996 to approximately 4% in 2004.

The evaluation of the soil trends in the 2004 Irrigation and Crop Plan noted the increased sodium and salt loading in 2004, but concluded that soils testing allows for the identification of problems well enough in advance before system failure.

GROUND WATER

The geology and hydrogeology of the pond/sprayfield site have been explained (Budinger & Associates, 1993 and 1995; Thorne, 1997; Cascade Earth Sciences, 1999).

The topography of the site is gently rolling. The soils overlay basalts and are predominately silt and sandy loams, and have low clay and organic content which lends them to have weak structure and vulnerable to compaction. The basalt dips to the south towards the E. Low Canal.

Two types of ground water are at the site: an upper-most unconfined ground water that is seasonal and occurs in isolated non-contiguous areas, and deeper basalt ground water. The upper aquifer is shallow (approximately 10ft bgs) and recharge is from irrigation, precipitation, and leakage from irrigation canals and laterals. The deeper basalt aquifer supplies most of the wells used for production crop irrigation.

Four monitoring wells were installed in July 1993; Fig. 2. The upgradient well (MW-4) was installed in the northeast corner of the site and has been dry since it was installed. The ground water quality at MW-1 showed signs of adverse impact from the original earthen lined pond (high TDS and the presence of ferrous iron) and was the basis for the lining of the pond in 2000. It has been dry since the completion of the lined pond.

The two downgradient wells (MW-2 and 3) are located along the East Low Canal. Sections of the canal walls near the wells are lined with concrete which is weathered and uneven. The U.S Bureau of Reclamation and irrigation district control the availability and distribution of the water in the canal. It is generally available for use during April through October.

Ground water data submitted by WPC in the monthly discharge monitoring reports for the period June 01 – December 05 was reviewed (Addendum):

Water level: The ground water level at both downgradient monitoring wells (MW2 and 3) appears to be influenced by the presence of water in the E. Low Canal; Fig. 3. Ground water is not present in MW2 until water is in the canal. Levels rise in both wells as water enters the canal in the Spring/summer, and decline as water leaves the canal in the late Fall. This coincides with what was found in the latest hydrogeologic report for the site; Thorne, 2005. (Note: the rise in the water elevations at MW2 and the canal in October 2005 can not be explained. This is the time of year when the canal system is emptied of water, and when well water levels decline).

Nitrate: Concentrations at MW2 show a decreasing trend, while values at MW3 have been generally low with seasonal spikes; Fig. 4. The 2005 HG report attributed the declining nitrates at MW2 to the elimination of winter-time irrigation since the completion of the new lined ponds in 2000; Thorne, 2005. The early spring nitrate pulses at MW3 can not be fully explained. However their consistent occurrence could be due to percolate loss from winter/Spring precipitation and irrigation. The low levels in the summer may be due to the presence of water and the dilution effects from E. Low Canal seepage.

TDS: Dissolved salt concentrations at MW2 have been consistently higher than the values at MW3; Fig. 5. However, values at MW2 show a decreasing trend from approximately 500 mg/L to 250 mg/L. The concentration of TDS at MW3 has been relatively constant; 200 mg/L. The lack of dilution effect by canal seepage suggests that soil/wastewater salts may be percolating to the groundwater.

Stiff and Piper Diagrams

The current discharge permit required some testing of cation/anion composition of the wells, irrigated wastewater, and East Low water. The purpose was to provide data to construct Stiff and/or Piper diagrams for each location. These diagrams provide a visual representation of the ion concentration of water.

The composition of ground water at MW2 and 3 appears to be a combination of the East Low water and irrigated wastewater; Figs. 6, 7, and 8. The high chloride content of the irrigated wastewater has not been manifested in either of the wells. Chloride concentrations are variable in both wells (Fig. 9; Addendum). The average values in MW2 (35.6 mg/L) and MW3 (12.3 mg/L) are well below the ground water criteria; 250 mg/L.

A simple ionic balance was done for the wells, the canal, and the irrigated wastewater. There was general balance of the cations (Na, K, Ca, Mg) and anions (Cl, SO_4, HCO_3) for the canal and at MW2, however there was essentially no balance at MW3 and the irrigated water. The cation charge at MW3 was approximately 2.5 times higher than the anions. This was due to a very high average calcium concentration at MW3 (467 mg/L). A review of the DMR data for MW3 showed several questionable data values:

- For Feb 2002: bicarbonate value of 1670 mg/L; calcium of 3080 mg/L; magnesium of 349 mg/L. All values much higher than all other values reported.
- For Feb 2003: bicarbonate value of 1520 mg/L; calcium of 3560 mg/L; magnesium of 536 mg/L. All values much higher than all other values reported.

A similar review of the reported cation/anion data for the irrigated water showed similar questionable data values:

- Calcium values ranged from <0.4 mg/L to 2950 mg/L
- Bicarbonate values ranged from <10 to 1354 mg/L
- Chloride values ranged from 792 to 15,700 mg/L

It appears that the cation/anion data that has been submitted for MW3 and the irrigated wastewater do not accurately show the quality of these waters. It is suggested that some form of QA program be implemented by the Permittee or the testing lab to insure accurate monitoring data.

Ground Water Evaluation

The 2005 hydrogeologic report (Thorne, 2005) was submitted as required by the discharge permit to determine, in part, if the sprayfields are protecting the ground water. The report made the following conclusions and recommendations:

1. It appears that the sprayfields are protecting ground water
2. Lining of the pond has eliminated the impact to the ground water in the vicinity of MW1
3. The elimination of winter irrigation has resulted in the seasonal presence of ground water in the downgradient wells during summer irrigation and the presence of water in the canal.
4. The ground water at MW2 and 3 is a mixture of canal seepage and irrigation leachate.
5. Soil monitoring be used as the primary method to insure the sprayfields are protecting the ground water.

PERMIT STATUS

The previous permit for this facility was issued on April 13, 2001 and modified on February 12, 2004. The amendment changed the method of flow monitoring from the processing facility from using a Parshall flume to a newly installed in-line meter.

An application for permit renewal was submitted to the Department on December 5, 2005 and accepted by the Department on March 1, 2006.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility last received a site visit on March 29, 2006.

During the history of the previous permit, the Permittee has remained in compliance based on Discharge Monitoring Reports (DMRs) and other reports submitted to the Department and inspections conducted by the Department.

WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the permit application and in discharge monitoring reports. The proposed wastewater discharge prior to land application is characterized for the following parameters as presented in the application. As previously explained, these values represent the quality of the wastewater prior to the addition of supplemental water to achieve the 4:1 mix.

Table 1: Wastewater Characterization

Parameter	Concentration
BOD_5	879 – 3474 mg/L; Avg = 2543 mg/L
Fixed Dissolved Solids	2888 – 12,300 mg/L; Avg = 9077 mg/L
Ammonia-N	2.15 – 134 mg/L; Avg = 33.4 mg/L
pH	4.27 – 6.81 s.u.
TKN-N	27 – 167 mg/L; Avg = 132 mg/L
Calcium	<0.4 – 2950 mg/L; Avg = 1666 mg/L
Chloride	492 – 15,700 mg/L; Avg = 5406 mg/L
Bicarbonate	<10 – 1354 mg/L; Avg = 611 mg/L
Magnesium	42.5 – 60.9; Avg = 55.1 mg/L
Potassium	74.5 – 227 mg/L; Avg = 157 mg/L
Sodium	278 – 1060 mg/L; Avg = 602 mg/L
Sulfate	7 – 675 mg/L; Avg = 190 mg/L

The process wastewater has high organic strength and is rich in inorganic salts. Calcium and chloride are the predominate cation and anion, respectively. The values presented in the application are very similar to what was reported to Ecology in monthly discharge monitoring reports for the period January 2001 – December 2005; Addendum.

PROPOSED PERMIT LIMITATIONS

State regulations require that limitations set forth in a waste discharge permit must be either technology- or water quality-based. Wastewater must be treated using all known, available, and reasonable treatment (AKART) and not pollute the waters of the State. The minimum requirements to demonstrate compliance with the AKART standard were determined in the engineering report (CES, 1999), in conformance with *Guidelines for the Preparation of Engineering Reports for Industrial Wastewater Land Application Systems*, May 1993.

The permit also includes limitations on the quantity and quality of the wastewater applied to the sprayfield that have been determined to protect the quality of the ground water. The approved engineering report includes specific design criteria for this facility. Water quality-based limitations are based upon compliance with the Ground Water Quality Standards (Chapter 173-200 WAC).

The more stringent of the water quality-based or technology-based limits are applied to each of the parameters of concern. Each of these types of limits is described in more detail below.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

All waste discharge permits issued by the Department must specify conditions requiring available and reasonable methods of prevention, control, and treatment of discharges to waters of the state (WAC 173-216-110). The following permit limitations and best management practices are necessary to satisfy the requirement for AKART:

1. Wastewater shall be land applied via spray irrigation not to exceed agronomic rates (as defined in the Department's ground water implementation guidance) for total nitrogen and water, and at rates for other wastewater constituents that are protective of background ground water quality.
2. Total nitrogen and water shall be applied to the sprayfields as determined by a current irrigation and crop plan.
3. The system must be operated so as to protect the existing and future beneficial uses of the ground water and not cause a violation of the ground water standards.

GROUND WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's ground waters including the protection of human health, WAC 173-200-100 states that waste discharge permits shall be conditioned in such a manner as to authorize only activities that will not cause violations of the Ground Water Quality Standards. The goal of the ground water quality standards is to maintain the highest quality of the State's ground waters and to protect existing and future beneficial uses of the ground water through the reduction or elimination of the discharge of contaminants to ground water [WAC 173-200-010(4)]. This goal is achieved by [Ecology's GW Implementation Guidance, Abstract, page x]:

1. Requiring that AKART (all known available and reasonable methods of prevention, control and treatment) be applied to any discharge;
2. Application of the antidegradation policy of the ground water quality standards. This policy mandates protecting background water quality and preventing degradation of water quality which would harm a beneficial use or violate the ground water standards; and
3. Establishing numeric and narrative criteria for the protection of human health and welfare in the ground water quality standards.

Numeric ground water criteria (maximum contaminate concentrations) are based on drinking water quality criteria. Applicable criteria concentrations are listed below:

Table 2: Ground Water Quality Criteria

Total Dissolved Solids	500 mg/L
Chloride	250 mg/L
Sulfate	250 mg/L

Nitrate	10 mg/L
pH	6.5 to 8.5 standard units

The intent of the ground water quality standards is to protect background water quality to the extent practical, rather than to allow degradation of ground water quality to the criteria. The procedures for estimating background water quality are contained in the Guidance Document for Implementing the Ground Water Standards (Ecology, 1996). Background water quality is defined as the 95 percent upper tolerance interval with a 95 percent confidence. The continued dry conditions at the upgradient well (MW4) does not allow for the determination of the background water quality at the sprayfield site.

The most recent hydrogeologic evaluation of the site, based on data for 1993-2004, concluded that the sprayfields are protecting the ground water; Thorne, 2005. The evaluation report recommended that no new monitoring wells be installed because of the discontinuous and seasonal nature of the ground water above the basalt, and to use soil monitoring as the primary method to assess whether the sprayfields may be impacting the ground water due to excessive leaching.

Ecology's review of the ground water data at the downgradient wells, and the nutrient and water loading presented in the annual irrigation and crop plans tends to support the findings of the 2005 HG study. However, the excessive amount of water leached from the site, and the elevated soil salinity levels indicate a higher potential to impact ground water.

Ecology will not require the installation of a new upgradient well during this permit cycle. However, it will require Western Polymer to: 1) actively look for and bring on-line additional sprayfield lands to spread its salt load to eliminate or reduce wastewater loading to those fields that show excessive leaching and elevated soil salinity levels; and, 2) reduce the amount of water leached from the sprayfields. If in the determination by Ecology that sufficient additional acreage is not brought on-line during this permit cycle to reduce the potential to impact ground water and/or additional measures are not taken to reduce salt concentrations in the wastewater and the leaching fraction, some form of additional monitoring will likely be required in the next permit; e.g., a new upgradient well; vadose zone monitoring. Ecology's determination will be based on information presented in the annual irrigation and crop plan.

The permit will require the Permittee to report the progress in adding new sprayfields in the annual irrigation and crop plan.

Ground water monitoring, and soil monitoring and trend analysis reporting will continue to be required in the proposed permit to assess sprayfield operations and ground water protection. Changes will be made in the annual irrigation and crop plan to include estimates of water and nutrient loading and leaching requirements for the upcoming year. These will be compared to actual values when the ICP report is submitted for the crop year.

COMPARISON OF LIMITATIONS WITH THE EXISTING PERMIT ISSUED APRIL 13, 2001

Table 3: Comparison of Previous and New Limits

Parameter	Existing Limits	Proposed Limits
Average monthly flow from processing facility:	97,000 gpd	97,000 gpd
Maximum daily flow from processing facility:	132,500 gpd	132,500 gpd
Acreage	333	333

The existing and proposed average monthly flow limit values are larger than the design flow; 62,500 gpd (CES, 1999). Information received from Western Polymer in a letter dated January 4, 2001 requested that the average flow be increased to 97,000 gpd. This was based on a worst case flow and a pond storage capacity of 14.55 MG that would provide 150 days of storage.

The maximum flow limit is based on the value given in the permit application. This value is less than the design flow capacity of the 8 inch transmission line from the processing facility to the pond site; 864,000 gpd (CES, 1999).

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are specified to verify that the treatment process is functioning correctly, that ground water criteria are not violated, and that effluent limitations are being achieved (WAC 173-216-110).

WASTEWATER MONITORING

The monitoring schedule is detailed in the proposed permit under Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

PROCESS WASTEWATER MONITORING

The single monitoring requirement of flow from the processing facility to the pond site will be continued in the proposed permit.

IRRIGATED WASTEWATER MONITORING

As previously explained, the Permittee has been sampling the irrigated wastewater at the pumphouse located adjacent to the storage lagoon as per permit requirements. This location is upstream of where supplemental water is added to achieve the 4:1 mix ratio and therefore does not represent what is being applied to the fields.

After discussions with the Permittee, it has been decided to require the irrigated wastewater be sampled at two locations and use the average to represent the quality of the wastewater being irrigated with the 4:1 mix. Sample petcocks will be installed at the mixing manifold located in

field #4 and at the riser pipe at field #5; Fig. 2. The design of the manifold and location of the petcock is a short distance and does not allow complete mixing before the water is applied to field #4. However, the field #5 sample site allows for almost a mile of mixing before application. Combining the near and far mixing concentrations should result in a representation of the applied nutrient and salt concentrations.

The testing schedule and list of parameters will remain essentially unchanged from the current permit requirements. Carbonate testing will be eliminated. The units of measure for the list of cations and anions will not require "meq/L"

One addition to the list of test parameters will be some limited testing for "soluble BOD". This organic fraction of the wastewater can percolate deeper into the soils, and be mineralized and nitrified to cause nitrates to be leached into the ground water. In addition, the mineralization of the organic fraction of the wastewater can lead to acidic conditions in the soil from the formation of carbonic acid. Depending on the pH, these conditions can lead to the formation of soluble calcium, sodium, manganese, and iron salts from ions in the wastewater and from the soil which can be leached to the ground water.

It is understood that there is no standard sample preparation or test procedure for soluble BOD_5. After some discussions, Ecology agrees that the test be run the same as for the standard BOD_5 test, but that the sample be first filtered through at least a 1.2 um filter (e.g., glass fiber) prior to the testing.

Eighteen (18) monthly samples will be collected for soluble BOD_5. Samples will only be collected when wastewater is spray irrigated. The number of samples was arrived at using guidance in Ecology's Permit Writers Manual (appendix 13) for a confidence of 90%, relative error of 0.2, a coefficient of variation of 0.6, and an added margin of safety.

CROP MONITORING

Monitoring of the crops grown on the sprayfields will be continued in the proposed permit. This information will be reported in the irrigation and crop plan and be used to develop the nutrient, water and salt budgets for the fields as required by the plan.

The list of cations and anions will be replaced with "ash weight" (mg/Kg, dry wt). The ash weight will provide an estimate of the total inorganic salt content of the plant tissue. This information will provide an estimate of the fixed dissolved solids uptake by the crop and allow for the determination of a dissolved salt balance for the fields.

Sample collection for testing will be required for all grain/grass-type of crops (alfalfa; wheat; mint, etc.). These values will be used in the determination of the end-of-year nitrogen/nutrient, and water balance reporting requirements. For non-forage type of crops (e.g., corn, potatoes), the use of literature values for nitrogen/nutrient uptake will be acceptable.

SOIL MONITORING

Twice per year soil monitoring in the current permit will be extended to the proposed permit. Given that there is no upgradient ground water well, and that soil monitoring has been recommended and is being used to assess the effectiveness of the sprayfields to protect the ground water, some changes in the soil testing will be made:

1. "Moisture content" testing will be eliminated. While this information is important for irrigation management, it has limited use in assessing soil trends that could impact the ground water.
2. Anion and cation testing will be extended to include the entire 6ft root zone depth. Given the high and increasing concentrations of sodium, calcium, and chloride in the wastewater, it is important to have an understanding of how these parameters are being managed in the root zone.
3. Ammonia testing will be eliminated, but TKN testing will be extended to the entire 6ft root zone depth.
4. ESP and CEC reporting will also be extended to the entire 6ft depth.
5. Total phosphorus testing will also be extended to the entire 6ft depth.

VADOSE ZONE MONITORING

This form of sampling will not be required in the proposed permit. However, if additional sprayfield acreage is not brought on-line during this permit cycle and/or salt loadings are not reduced, the installation of a vadose zone monitoring system may be required in the next permit, given that finding an upgradient ground water monitoring site may be difficult.

GROUND WATER MONITORING

The monitoring of ground water at the site is required in accordance with the Ground Water Quality Standards, Chapter 173-200 WAC. The Department has determined that this discharge has a potential to pollute the ground water. Therefore the Permittee is required to evaluate the impacts on ground water quality. Monitoring of the ground water at the site boundaries and within the site is an integral component of such an evaluation.

Data for MW1 shows that it has been dry since January 2001 after the completion of the lined impoundment, while data for MW4 shows that it has been dry since soon after it was installed in 1993. It has been decided to eliminate testing of these wells in the proposed permit.

The list of test parameters and schedule for MW2 and 3 will remain essentially unchanged from the current permit. The following changes will be made:

1. Carbonate testing will be eliminated. The pH of the ground water is generally less than that required for carbonate to be present; 8.3.
2. The units of measure for the list of cations and anions will not require "meq/L".

EAST LOW CANAL MONITORING

Given the closeness of both downgradient wells to the canal, the limited testing of the canal will be extended to the proposed permit, but the frequency of testing will be changed from 3/year to 1/year. Temperature monitoring will be eliminated, and carbonate testing will be eliminated because of the pH of the canal water.

The static water elevation measurement will be extended from "April – October" to "March – November".

SUPPLEMENTAL IRRIGATION WATER MONITORING

A large amount of supplemental water is required to meet the crop demand because of the small total volume of process wastewater produced each year. For the 2004 crop year, the process wastewater made up only 9% of the total water requirement; Soiltest, 2005. The nitrogen and salt load from this large amount of water must be accounted for in the determination of the annual nutrient budgets for each field.

Therefore, the proposed permit will require some limited testing (once/yr) of the supplemental water. All sources of supplemental water (irrigation canal; wells) will be tested. The results (total Kjeldahl nitrogen; nitrate; total dissolved solids) will be reported in the annual irrigation and crop plan. Average values can be used to determine the supplemental water nitrogen and salt loads to each field.

The proposed permit will also require that the flow of supplemental irrigation to each field over and above that used to mix with the wastewater to achieve the 4:1 mix ratio, be measured and accounted for. This information is required to develop hydraulic and nutrient budgets for each field.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-216-110).

FACILITY LOADING

Design criteria for the sprayfield site is presented in the engineering report prepared by Cascade Earth Sciences (CES, 1999) and were based on the maximum starch production capacity, and on historical wastewater flows and quality. Wheat and alfalfa were used to estimate loading rates.

Monthly average flow (max. month):	62,500 gpd
Yearly total flow:	20.8 MG
Total annual wastewater net N load:	60 – 80 lbs/acre
Total annual wastewater salt load:	8800 – 12,500 lbs/acre
Total annual wastewater BOD load:	1600 – 1900 lbs/acre
Leaching fraction:	0 – 6%

Leaching requirement: 8 – 12%

The flow limits in the proposed permit will exceed the design flow values. However, this has been previously explained.

Because the design values in the 1999 engineering report were based on historical chemical and flow data prior to the 2000 upgrade at the sprayfield site, they do not reflect the current sprayfield operational practices and wastewater quality. Therefore, the 1999 design values will not be put in the proposed permit.

Instead, the permit will require WPC to update the engineering report to re-define the treatment capacity of the sprayfield system based on upgrade operations and wastewater characterization data.

The permit requires the Permittee to maintain adequate capacity to treat the flows and waste loading to the treatment plant (WAC 173-216-110[4]). For significant changes in loadings to the treatment works, the permit requires a new application and an engineering report (WAC 173-216-110[5]).

ENGINEERING REPORT – UPDATE

As previously discussed, the permit will require an update of the current engineering report to reflect the loadings from the summer irrigation/winter storage operations at the site. The report shall:

1. Update and define the treatment capacity of the sprayfields for nitrogen based on at least a five year crop rotation.
2. Update the design hydraulic and BOD load to the fields, and the leaching requirement to control soil salinity for the five year crop rotation.
3. An evaluation of what steps will be taken to reduce the salt loading to the fields; e.g., BMPs, pollution prevention practices, additional fields.

IRRIGATION AND CROP MANAGEMENT PLANS

The irrigation and crop management (ICM) plan is required to support the engineering report and operations and maintenance manual. This plan shall include a consideration of wastewater application at agronomic rates and should describe and evaluate various irrigation controls.

The plan shall:

1. Summarize the operations of the entire treatment site for the previous year and describe the operations for the upcoming year relative to wastewater, fertilizer, and supplemental water loadings (e.g., nitrogen, salt, BOD, and water loadings) based on the chosen crop rotation.
2. Develop a nitrogen budget for each field that includes nitrogen from wastewater, fertilizer and supplemental irrigation water. Compare the load values for each field with the estimated loads presented in the previous year's ICM Plan. Load values to the sprayfields will be determined from the average concentration of the nitrogen fractions measured at sprayfield

#4 and #5 sampling sites, as previously described, and the average values from the supplemental water sources.

3. Develop a water budget for each field to include hydraulic loads from the wastewater, supplemental water, and precipitation, and determine the leaching fraction for each field.

4. Develop a salt budget for each field. Salt loadings to each field shall include loads from the wastewater, fertilizer, and supplemental water. Compare the salt load to each field with the estimated loads presented in the previous year's ICM Plan. Load values will be determined from the average fixed dissolved solid concentrations measured in the wastewater at sprayfield #4 and #5 sampling sites, as previously described, and the average values from the supplemental water sources.

    a. The report shall determine the need and describe any planned leaching to control soil salinity.

5. Describe the BOD loading to each field, and compare the loadings to each field with the estimated loads presented in the previous year's ICM Plan. Load values will be determined from the average BOD concentrations measured in the wastewater at sprayfield #4 and #5 sampling sites, as previously described.

6. Report all crop and soil testing results.

    a. Continue to report the nitrate, soluble salts, ESP, and TKN trends in the top 3 feet and 4-6 foot depths of the soil as currently done.

7. Report the flows and chemical test results of the supplemental irrigation water samples.

8. Report the fresh: wastewater mix ratio that was used whenever wastewater was irrigated.

In addition to these specific reporting requirements for the fields, the plan shall:

1. Report on the progress of acquiring and bringing on-line additional sprayfield acreage.

2. Report on the effectiveness of the 4:1 mix ratio to reduce the irrigated wastewater salt concentration to recommended values (2000-3000 mg/L), and any evaluation that was done on its continued use or proposed change (i.e., increase).

OPERATIONS AND MAINTENANCE

The proposed permit contains condition S.5. as authorized under Chapter 173-240-150 WAC and Chapter 173-216-110 WAC. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

OPERATIONS AND MAINTENANCE MANUAL – UPDATE

An O&M manual was submitted in April 2002 as required by the current permit. A review of its contents indicated that it should be updated. Changes have been made to the flow monitoring at the processing facility, the transmission line and the canal crossing.

The requirements for an O&M manual are listed in WAC 173-240-150. Access to the regulation can be found at: http://www.ecy.wa.gov/laws-rules/ecywac.html#wq

BEST MANAGEMENT PRACTICES

Implementing best management practices is a part of providing AKART to the wastewater. The following BMPs will be required in the proposed permit:

1. Freshwater shall be mixed with wastewater at a minimum 4:1 mix ratio whenever wastewater is spray irrigated.
2. Whenever leaching is required to control soil salinity, the leaching requirement shall be met using precipitation and/or fresh water.
    a. The leaching requirement should be 8 – 12%
3. The BOD load to the fields shall not exceed 100 lbs/acre/day.
4. Wastewater shall not be applied onto fallow or frozen fields.

TECHNICAL RESOURCES FOR ENGINEERING EFFICIENCY (TREE)

Ecology's TREE program offers free technical assistance to businesses to reduce water and chemical use, hazardous waste generation, and wastewater and solid waste production. And at the same time increase efficiency, reduce supply costs, and save money. The program is comprised of pollution prevention experts (civil, mechanical, chemical engineers; biologists) who conduct a site visit and prepare a report with recommendations. This program is technical assistance only; it does not perform regulatory enforcement.

To help reduce salt loadings from the processing facility, Western Polymer is encouraged to contact the TREE program and arrange for a site visit (Ms. Lynn Coleman, 360.407.6738). This is a very popular program and an early contact would be beneficial to Western Polymer.

SOLID WASTE PLAN

A solid waste plan was submitted in March 2002 as required by the current permit. As described in the plan, there are two primary sources of solid wastes: screenings from the raw starch, and the settling basins at the pond site. Estimated volumes from each are 60 and 600 cubic yards, respectively.

Solids that are removed from the settling basins are stockpiled near the pond site for approximately one year to dewater. All solids are spread onto nearby land as per agronomic rates determined by the Permittee's consultant.

This proposed permit requires, under the authority of RCW 90.48.080, that the Permittee review and update the solid waste plan designed to prevent solid waste from causing pollution of the waters of the state and submit it to the Department.

SPILL PLAN

A spill plan was submitted in April 2002 as required by the current permit. It contains some basic information but is lacking in specific information, like a list of who and what agencies should be notified in case of a spill; e.g., Ecology; Bureau of Reclamation; irrigation district; local fire dept.

A review of Ecology's permit file shows that two wastewater spills occurred in 2003 from the wastewater transmission line from the processing facility to the pond site. Both were reported to Ecology.

The proposed permit will require the Permittee to review and update the spill plan. It is suggested that the "Contingency plan and emergency procedure" and "Emergencies" sections of the Dangerous Waste Regulations (WAC 173-303-350 and -360) be used as guidance for what should be in the plan. Not all of the section will apply to the Western Polymer facility. The regulation can be found at: www.ecy.wa.gov/biblio/wac173303.html.

GROUND WATER QUALITY EVALUATION (HYDROGEOLOGIC STUDY)

The data collected at MW2 and MW3 suggests that the ground water quality at these sites is the result of a mixture of percolate loss from the fields and seepage from the irrigation canal. In lieu of installing new wells to monitor the impacts of just the sprayfields, Ecology agrees to continue to use soils data to evaluate sprayfield's operation and the potential to impact ground water.

The proposed permit will not require additional studies of the hydrogeology beneath the sprayfield site to determine the potentiometric surface of the ground water for the purpose of installing new wells that can measure the impacts of the sprayfields on the ground water.

The continued use of soil sampling instead of installing new monitoring wells will depend on the success of the Permittee to reduce salt loading by bringing additional sprayfield acreage on-line, and/or reduce the wastewater salt concentration or flow volume. This determination will be made during the next permit cycle.

GENERAL CONDITIONS

General Conditions are based directly on state laws and regulations and have been standardized for all industrial waste discharge to ground water permits issued by the Department.

Condition G1 requires responsible officials or their designated representatives to sign submittals to the Department. Condition G2 requires the Permittee to allow the Department to access the treatment system, production facility, and records related to the permit. Condition G3 specifies conditions for modifying, suspending or terminating the permit. Condition G4 requires the Permittee to apply to the Department prior to increasing or varying the discharge from the levels stated in the permit application. Condition G5 requires the Permittee to construct, modify, and operate the permitted facility in accordance with approved engineering documents. Condition G6 prohibits the Permittee from using the permit as a basis for violating any laws, statutes or regulations. Conditions G7 and G8 relate to permit renewal and transfer. Condition G9 requires the payment of permit fees. Condition G10 describes the penalties for violating permit conditions.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, and to protect human health and the beneficial uses of waters of the State of Washington. The Department proposes that the permit be issued for five years.

REFERENCES FOR TEXT AND APPENDICES

Budinger & Associates. 1995. Wastewater Treatment Facility, Moses Lake, WA., Preliminary Hydrogeologic Investigation, ADDENDUM #1, Location of Monitor Wells & Logs for Offset Borings. Januray.

Budinger & Associates. 1993. Water Water Treatment System, Moses Lake, WA, Preliminary Hydrogeologic Investigation. Letter to Western Polymer. November.

Esvelt Environmental Engineering. 1995. Engineering and Hydrogeologic Evaluation, Processing Wastewater, Land Application System, Western Polymer Corporation. February

Soiltest Farm Consultants. 2005. Western Polymer Corportation Land Application Report –2004 & Crop Management Plan—2005. May.

Thorne, Paul D. 2005. Addendum Report – Final Hydrogeologic Study for Land Application of Wastewater, Western Polymer Corportation. June

Thorne, Paul D. 1997. Final Hydrogeologic Study, Land Application of Process Wastewater, Western Polymer Corportation. May

Washington State Department of Ecology, 1993. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, Ecology Publication # 93-36. 20 pp.

Washington State Department of Ecology.

Laws and Regulations(http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information
(http://www.ecy.wa.gov/programs/wq/wastewater/index.html

Washington State Department of Ecology, 1996. Implementation Guidance for the Ground Water Quality Standards, Ecology Publication # 96-02.

Washington State University, November, 1981. Laboratory Procedures - Soil Testing Laboratory. 38 pp.

APPENDICES

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on March 6 and 13, 2006 in the Columbia Basin Herald to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department published a Public Notice of Draft (PNOD) on May 25, 2006 in the Columbia Basin Herald to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
4601 North Monroe Street
Spokane, WA 99205-1295

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-216-100). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing.

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 509.329.3524, or by writing to the address listed above.

The Fact Sheet and permit were written by Don Nichols.

APPENDIX B--GLOSSARY

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation--The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of the collection or treatment facility.

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

Distribution Uniformity--The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Engineering Report--A document, signed by a professional licensed engineer, which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar

day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Soil Scientist--An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Dissolved Solids--That portion of total solids in water or wastewater that passes through a specific filter.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent pollution of the receiving water.

APPENDIX C--RESPONSE TO COMMENTS

Comments were received from Western Polymer and the U.S. Bureau of Reclamation on the draft permit. Responses to these comments are attached.

The first set of comments received from Western Polymer, dated May 12, 2006, was received after the factual review period for the draft permit. Most of the comments did not address factual issues but rather permit conditions. Responses to these comments were postponed until after the public comment period. As a result, some of the permit sections that were commented on do not match the permit that was sent out for public comment because changes were made in the permit and Fact Sheet between the factual and public review period.

COMMENTS TO SWDP 5273, Western Polymer	RESPONSES

WESTERN POLYMER CORPORATION
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RECEIVED
MAY 15 2006
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

May 12, 2006

Department of Ecology
Attn: Don Nichols
Water Quality Section
4601 North Monroe
Spokane, WA 99205-1295

Dear Mr. Nichols:

RE: Factual Review of Western Polymer's Draft Permit and Fact Sheet for State Waste Discharge Permit No. ST 5273

Western Polymer has carefully reviewed the Draft Permit and while essentially factually, correct, we find many items that need comment or clarification.

1 **Section S2.B:** The Flow of Irrigated Wastewater, to what parameters does the "average" and the "max" refer? Please provide guidance on the meanings of these terms.

2 **Section S2.D:** The canal is empty most of March and all of November. Historically, the canal starts filling between the 22nd and 26th of March and the water is turned off between the 17th and 25th of October. It usually takes three or four days to reach maximum level and the same amount of time to completely drain it. The level in the canal in March will be very dependent on what day the measurement is taken until it is filled.

Western Polymer has always assumed all readings should be done when the canal is completely full. If this is not accurate, DOE needs to provide guidance on when to measure the canal in March. In early November there may be some standing water in the bottom of the canal. Unless DOE wishes to know the level of these puddles, the requirement to measure in November should be dropped.

3 **Section S2.E:** Does "Supplemental Irrigation Water" refer to fresh water pumped from Western Polymer's wells to the farm? We have not done this since the lined pond was installed. We have the capability to do this, but the pond makes it unnecessary. If there is no flow, there is nothing to report. Section S2.E should be removed.

4 **Section S2.F:** Testing at multiple depths is good. However, Dan Nelson, PhD, Certified Soil Scientist from Soiltest, has stated that testing twice per year is unnecessary and will be expensive. It also will add "noise" to the system as the soil will be very different in

Response to Comment #1: As stated in Section S2.B of the permit, the flow values are for the irrigated wastewater applied to each field; the 4:1 mixed water. Therefore, the "average", "max", and "total annual" flow values are for each sprayfield that receive the mixed water. All values will be reported in the annual Irrigation and Crop Plan as explained in Section S2.B.

Response to Comment #2: The purpose of measuring the water level in the canal in March and November is to measure the change in water level at MW2 and MW3 as the canal fills with water. It may better explain the relationship between the wells and the canal expressed in water level and as depicted in Figure 3 of the Fact Sheet.

Ecology asks that the water level measurements in March and November be taken at a time that represents the level as it is filling (March) and being emptied (November). The footnote in Section S2.D will be changed to read:

"[1] 1/month shall mean March – November. **Mesurements shall be taken in March and November when the canal is filling and being emptied, respectively."**

Response to Comment #3: As explained in the "Supplemental Irrigation Water Monitoring" section of the Fact Sheet, the purpose of testing the fresh irrigation water is to account for the nitrogen and soluble salts that are contributed to the sprayfields from applying only fresh water. These nitrogen and salt loads must be accounted for in the total nitrogen and salt load to the fields as described in the annual irrigation and crop plan. As explained in the Fact Sheet, a single yearly sample is required from each fresh water irrigation water source that is applied to the sprayfields. Section S8.A.7 requires that the test results of the supplemental irrigation water samples be reported.

It is understood that fresh water from different sources can be applied to the sprayfields. Ecology would accept an average fresh irrigation water value for nitrogen and soluble salts derived from the test values for the different fresh water sources to be used in determining loading to the fields from the fresh water. Section S8.A.7 will be edited to show this:

"Report the test results for the supplemental irrigation water samples, **and the average values used for determining the irrigation water nitrogen and salt loading."**

COMMENTS TO SWDP 5273, Western Polymer	RESPONSES
spring versus the fall. Western Polymer recommends testing only once per year in the fall. 5 **Section S5:** If these criteria go into effect with this permit, Western Polymer will be immediately in violation of this permit in three of these four criteria. In your Fact Sheet, you cite CES 1999 as the source for these "Design" criteria. They appear to come from Table 8-1, of that report, (except leaching fraction). Table 8-1 lists estimates based on historical data. Section 8.2.1 of CES 1999 indicates that at loads of "63 - 79 lb-net nitrogen/acre" that "Supplemental fertilizer application will likely be required to optimize crop production." So 80 lbs per acre can not be above the agronomic rate. Section 8.2.4 of CES 1999 states that 1,914 lbs/ac is still well under the 100 lbs/acre/day suggested by the EPA and even under the 50 lbs/acre/day recommended by the State of Idaho. Section 8.2.2.1 "Leaching Requirement" of CES 1999 states that leaching factor should be such as to maintain electrical soil conductivity below 2 mmho/cm for most crops and as high as 4 mmho/cm if wheat is grown. This requires a leaching factor of 9% for 4 mmho/cm and 15% for 2.5 mmho/cm. It appears as if historical data has been mistaken for design criteria. 6 **Section S6.D:** Since the building of the storage lagoons, no wastewater has been applied to frozen ground. Applying to fallow ground in the fall is a common agronomic practice to return moisture to the soil after harvest. This allows a winter wheat crop to take up this water or a spring crop to get started before there is water in the East Low Canal. Also, often after harvest of wheat, there is "volunteer" wheat on "fallow" ground. DOE needs to allow for application to fallow ground consistent with agronomic practices. 7 **Section S9.B.1:** A prior schedule for herbicide, pesticide, and fertilizer application is difficult at best. The decision to apply these chemicals is based on factors that often can not be known in advance. As always, application of these expensive chemicals will be kept to a minimum, only applied as needed under advisement of a certified crop advisor, and as directed on the label. For these reasons, we request this requirement be removed. 8 In the **Fact Sheet**, page 6, fourth paragraph (just above "BOD Loading") it states that, "the fixed dissolved solids of the irrigated wastewater ranged from 6,330 to 12,200 mg/L; Addendum. It appears that the 4:1 mix ratio is insufficient." Those fixed dissolved solids results listed in the Addendum and taken from the Discharge Monitoring Reports are from wastewater coming directly from the storage pond that *has not been mixed* with fresh (canal) water. Section S2.B of the permit states, "The sampling point for the irrigated wastewater shall be at the irrigation pump house located adjacent to the storage ponds." This is before the wastewater is mixed in the farm's irrigation manifolds with fresh water. This is the same sampling point as required in Section S2.B of the April	Response to Comment #4: Given that there is no upgradient well to help determine impacts of the sprayfields on the ground water, and the influence of the canal on the two downgradient wells, soil monitoring is the primary method that is used to evaluate the operations of the site relative to protecting the ground water. With respect, basing the request to only do soil testing in the Fall because sampling is "expensive" and "unnecessary" without providing supporting technical information is not sufficient. It is understood that sampling in the Fall and Spring can be expensive and that "noise" is added to the database. But until information is submitted that supports the once per year sampling as being able to reliably monitor the operations of the sprayfields relative to protecting the ground water with some level of confidence, the two per year sampling requirement will remain in the permit. If information is submitted to Ecology after the permit is issued that technically supports the once per year testing and its ability to monitor protection of the ground water, and Ecology agrees then the permit can be modified and reissued with the reduced testing. Response to Comment #5: Section S5 (Facility Loading) of the draft permit that was sent to Western Polymer for factual review was eliminated from the permit when it was re-submitted for public comment. Response to Comment #6: Section S6.D in the factual review copy of the permit was re-numbered to S5.D when the permit was re-submitted for public review. Ecology understands the agronomic practice of adding water to fallow fields to raise the moisture level in preparation for seeding. But applying wastewater would not only add moisture, but also nitrogen, organics, and soluble salts. Without having a cover crop, there is no treatment. It is not known of it is common agronomic practice to apply fertilizer to fallow ground in preparation of seeding, especially in the Fall. Ecology also understands that volunteer crops can occur after harvest, such as wheat. Not applying wastewater to fallow fields complies with Ecology guidance for land treatment systems; Section S5.D of the permit will not be changed. However, it is requested that if wastewater is applied to plowed fields left unseeded, but with volunteer crops that this be made clear in the annual irrigation and crop plan to indicate the presence of some form of a cover crop.

COMMENTS TO SWDP 5273, Western Polymer	RESPONSES
2001 permit and is where "Irrigated Wastewater" samples were taken during all of the permit cycle, reported on the Discharge Monitoring Reports, and from where all the results in the Fact Sheet Addendum came. Simple ratio mathematics indicates a 4:1 mixing ratio should result in water actually applied to the spray fields of between 1,675 and 3,140 (rounded, estimating the canal FDS at 120 mg/L based on the maximum ions found during 2004 - 2005 testing period). This slightly exceeds the estimate of 2,000 to 3,000 mg/L. The 4:1 mixing requirement is the minimum mixing ratio used and it is more likely to be a greater ratio of fresh water to wastewater during most of the irrigation season. Please let us know if you have any questions regarding the above. We look forward to your response to our comments and requests. Western Polymer has prided itself on its commitment to environmental protection and we expect to continue that through this next permit cycle. Sincerely, Sheldon E. Townsend Co-Owner WESTERN POLYMER CORP. Cc: L. Townsend-White B. White D. Sell, Jr. K. Carlile D. Nelson, Soiltest D. Burgard, Cascade Earth Scientists	Response to Comment #7: Section S9.B.1 in the factual review copy of the permit was re-numbered to S8.B.1 when the permit was re-submitted for public review. The language in this section of the permit is standard language. Ecology agrees that scheduling pesticide and herbicide applications is condition-driven and can change. The requirement to report fertilizer scheduling is somewhat covered by the second reporting part of S8.B.1. Ecology agrees to edit Section S8.B.1: "Crop Management: The proposed acreage for each crop, cultivation and harvesting requirements, expected crop yields, and methods for establishing a crop. ~~and proposed schedule for herbicide, pesticide, and fertilizer application.~~" Response to Comment #8: This section of the Fact Sheet was re-written before it was re-submitted for public comment. This entire narrative was removed when it was discovered that the sampling location for the irrigated wastewater was prior to the addition of supplemental water to achieve the 4:1 mix ratio.

COMMENTS TO SWDP 5273, Western Polymer	RESPONSES

WESTERN POLYMER CORPORATION
32 ROAD "R" SE • MOSES LAKE, WASHINGTON 98837
(509) 765-1803 • FAX (509) 765-0327• www.westernpolymer.com

June 23, 2006

Department of Ecology
Attn: Don Nichols
Water Quality Section
4601 North Monroe
Spokane, WA 99205-1295

RE: Response to Western Polymer's Draft Permit and Fact Sheet for State Waste Discharge Permit No. ST 5273 (Comment Period)

Dear Mr. Nichols:

We have reviewed the Draft Permit and have the following comments/questions.

1 **Section S2.B:** The Flow of Irrigated Wastewater, to what parameters does the "average" and the "max" refer? Please provide guidance on the meanings of these terms.

2 **Section S2.C:** A total of 42 tests for MW #2 and 68 for MW #3 from January 1999 (as far back as records were easily obtainable) to June, 2006 have resulted in no ferrous iron present in any test. The requirement for this test should be dropped.

3 **Section S2.D:** The canal is empty most of March and all of November. Historically, the canal starts filling between the 22nd and 26th of March and the water is turned off between the 17th and 25th of October. It usually takes three or four days to reach maximum level and the same amount of time to completely drain it. The level in the canal in March will be very dependent on what day the measurement is taken until it is filled.

Western Polymer has always assumed all readings should be done when the canal is completely full. If this is not accurate, DOE needs to provide guidance on when to measure the canal in March. In early November, there may be some standing water in the bottom of the canal. Unless DOE wishes to know the level of these puddles, the requirement to measure in November should be dropped.

4 **Section S2.E:** Does "Supplemental Irrigation Water" refer to fresh water pumped from Western Polymer's wells to the farm? We have not done this since the lined pond was installed. We have the capability to do this, but the pond makes it unnecessary. If there is no flow, there is nothing to report. Section S2.E should be removed.

AN ISO 9001:2000 CERTIFIED COMPANY

Response to Comment #1: This comment was responded to in the previously submitted comments.

Response to Comment #2: Ecology recognizes that the ferrous iron test results for MW2 and 3 have been negative. Ecology agrees to "ramp down" the testing requirement from 1/month to 4 times per year. If testing continues to be negative, testing can be reduced to 2 per year during the next permit cycle.

Response to Comment #3: This comment was responded to in the previously submitted comments.

Response to Comment #4: This comment was responded to in the previously submitted comments.

COMMENTS TO SWDP 5273, Western Polymer	RESPONSES
5 **Section S2.F:** Testing at multiple depths is good. However, Dan Nelson, PhD, Certified Soil Scientist from Soiltest, has stated that testing twice per year is unnecessary in addition to being expensive. It also will add "noise" to the system as the soil will be very different in spring versus the fall. Western Polymer recommends testing only once per year in the fall or at the very least, in the spring only do testing similar to those required in Section S2.E of the April 13, 2001 permit.	Response to Comment #5: This comment was responded to in the previously submitted comments.
6 **Section S5.D:** Since the building of the storage lagoons, no wastewater has been applied to frozen ground. Applying to fallow ground in the fall is a common agronomic practice to return moisture to the soil after harvest. This allows a winter wheat crop to take up (and treat) this water or a spring crop to get started before there is water in the East Low Canal. Also, often after harvest of wheat, there is "volunteer" wheat on "fallow" ground. DOE needs to allow for application to fallow ground and volunteer or green manure crop consistent with agronomic practices.	Response to Comment #6: This comment was responded to in the previously submitted comments.
7 **Section S8:** Submitting the Irrigation and Crop Management Plan by April 1st has proven difficult at best as spring is a very busy time for all certified soil scientists. DOE should consider moving the due date to June 1st.	Response to Comment #7: Ecology understands that gathering, interpreting, and writing the annual irrigation and crop plan takes time. It is agreed that the submittal date of the annual report can be changed to June 1st of each year. The submittal date in Section S8 of the permit will be changed from "April 1st", to "June 1st" of each year.
8 **Section S8.B.1:** A prior schedule for herbicide, pesticide, and fertilizer application is difficult at best. The decision to apply these chemicals is based on factors that often can not be known in advance. As always, application of these expensive chemicals will be kept to a minimum, only applied as needed under advisement of a certified crop advisor, and as directed on the label. For these reasons, we request this requirement be removed.	Response to Comment #8: This comment was responded to in the previously submitted comments.
9 **Fact Sheet Page 4 "Irrigated wastewater sampling":** The June 1, 2001 permit required sampling of "Irrigation Wastewater Monitoring" to be "at the irrigation pump house" (Section S2.B). Since the pump house sample point came directly out of the pond, before mixing, Western Polymer believed that DOE wanted the sample to be of the undiluted wastewater. Western Polymer always knew that this sample point was before mixing and believed DOE did too. Only during the factual review period did we discover DOE thought this was diluted water mixed at a ratio of at least 4:1 with canal water.	Response to Comment #9: Comment noted. Ecology thanks Western Polymer for making it clear that the samples of the irrigation wastewater during the last permit cycle were taken prior to the addition of supplemental water. Ecology is very interested to see what the loading values are when the new sampling locations are used.
* * * Western Polymer has continuously looked for other land to apply our wastewater without too burdensome financial outlay. Land is not only expensive but tied up. The cost of building pipelines to fields is also prohibitive. Western Polymer is committed to protecting the environment. We have continued to invest in our process to reduce the amount of our wastewater. We have changed our cleaning equipment to optimize water usage, built a facility in North Dakota to move production (and thus discharges) there, installed vacuum filters to remove water from the process before it is used in the chemical reaction, lowering the amount of water that becomes laden with salt and nitrogen and allows usage of less chemicals. We have	General Comment: Ecology truly appreciates the efforts that have been taken by Western Polymer to reduce water and nutrient loading to the sprayfields. Ecology's request for additional sprayfield acreage is based, in part, on the increasing trend in the deep soil (4-6ft) soluble salts and shallow ground water. Information in the 2005-06 Irrigation and Crop Plan shows that soluble salts in the deep soil have increased from approximately 5 mmho/cm in 1996 to approximately 10 mmho/cm in 2005. Ecology is also concerned about the high leach fraction that has occurred in recent years. Adding more sprayfield acreage will spread the load, help reduce salt build-up, and lessen the amount of water leached from the root zone. Any and all efforts to reduce nutrient loading, especially dissolved salts, will help to protect the ground water.

COMMENTS TO SWDP 5273, Western Polymer	RESPONSES

United States Department of the Interior

BUREAU OF RECLAMATION
Ephrata Field Office
P.O Box 815
Ephrata, Washington 98823

RECEIVED
MAY 23 2006
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

IN REPLY REFER TO:
EPH-2604
ENV-6.00

MAY 22 2006

Ms. Cynthia Wall
Washington State Department of Ecology
4601 N Monroe Street
Spokane, WA 99205-1295

Subject: Draft State Waste Discharge Permit No. ST 5273, Western Polymer Corporation, East Columbia Basin Irrigation District, Columbia Basin Project, Washington

Dear Ms. Wall:

Thank you for the opportunity to review and comment on the proposed waste discharge permit.

In light of the increasing practice of applying effluent during the non-irrigation season, we propose that the language in Section S6. Best Management Practices D.4., which states "Wastewater shall not be applied onto fallow or frozen ground" be changed to read "Waste water shall not be applied onto fallow ground or between the months of November to March."

To maintain compliance with Section S6. Irrigation Land Application C. 3. d. waste water must not be applied in such a way that will cause leaching losses of constituents of concern beyond the treatment or root zone. According to the United States Department of Agriculture, Natural Resource Conservation Service the typical growing season for Washington State is April through October. There is near freezing temperatures in March and November and below freezing temperatures in December, January, and February. The application of waste water during the non-growing season will lead to leaching losses of constituents of concern beyond the treatment root zone.

If you have any questions, please contact Bruce Loranger at 509-754-0210.

Sincerely,

William D. Gray
Deputy Area Manager

Response to Comment #1: Ecology reviewed the annual irrigation and crop plans for 2000 – 2005 to determine when the Permittee generally begins and ends wastewater irrigation. With the exception to 2000, before the completion of the new storage ponds, wastewater irrigation generally occurs between March and October. This time period also coincides with the availability of supplemental water that is needed to mix with the wastewater for the required 4:1 ratio.

Section S6.D.4 will be changed from "Wastewater shall not be applied onto fallow or frozen ground", to "Wastewater shall not be applied to fallow ground or between the months of November to March."

Response to Comment #2: Comment noted. The wastewater sprayfields must be operated in a manner that limits the amount of leaching to protect the ground water. Leaching must be done on the wastewater sprayfields to control salinity, just as is done on general commercial agriculture fields. Section S5.D of the permit requires that the leaching requirement be met with fresh water or precipitation, and that the leaching fraction does not exceed 8-12%. The leaching requirement will be re-evaluated when design criteria of the sprayfields are submitted in the updated engineering report.

Wester. olymer – Approximate Permit Actions Timel.

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2006						Reissue permit						
2007						Irrigation & Crop Plan						Eng Rpt – Update O&M Manual – Update Spill Plan - Update
2008						Irrigation & Crop Plan						
2009						Irrigation & Crop Plan						
2010						Irrigation & Crop Plan						Permit App.
2011						Irrigation & Crop Plan						

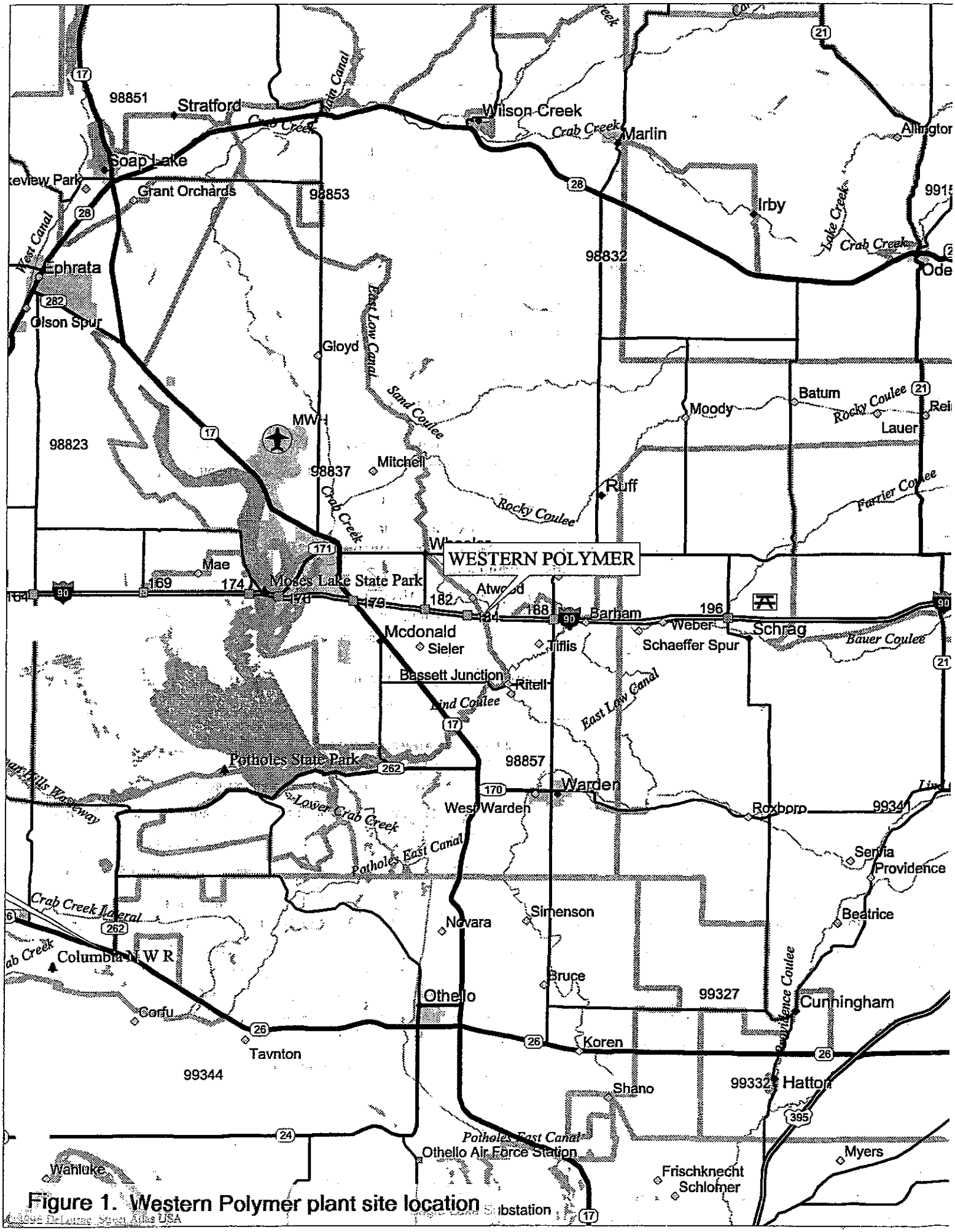


Figure 1. Western Polymer plant site location

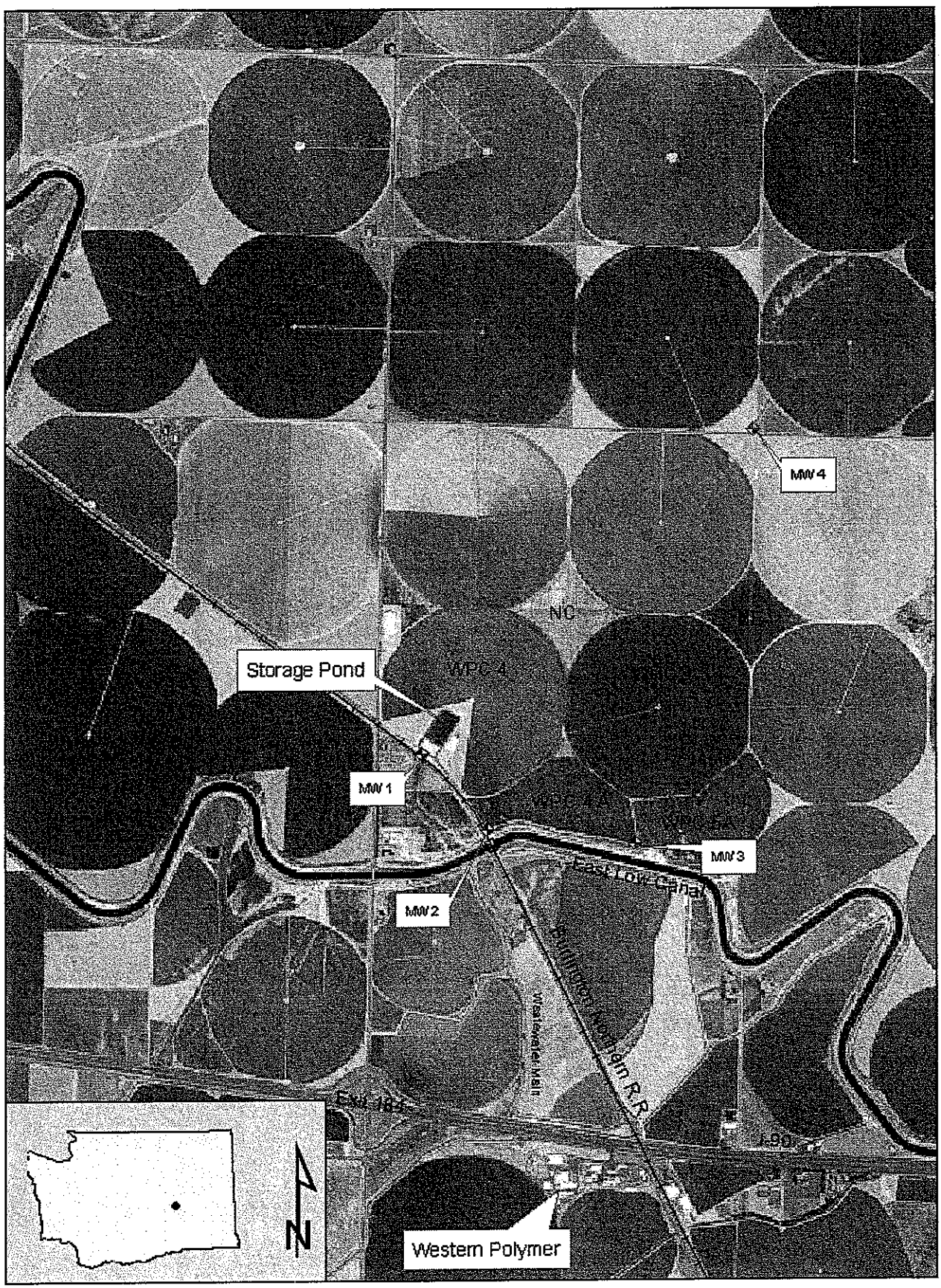


Figure 2.

Figure 3

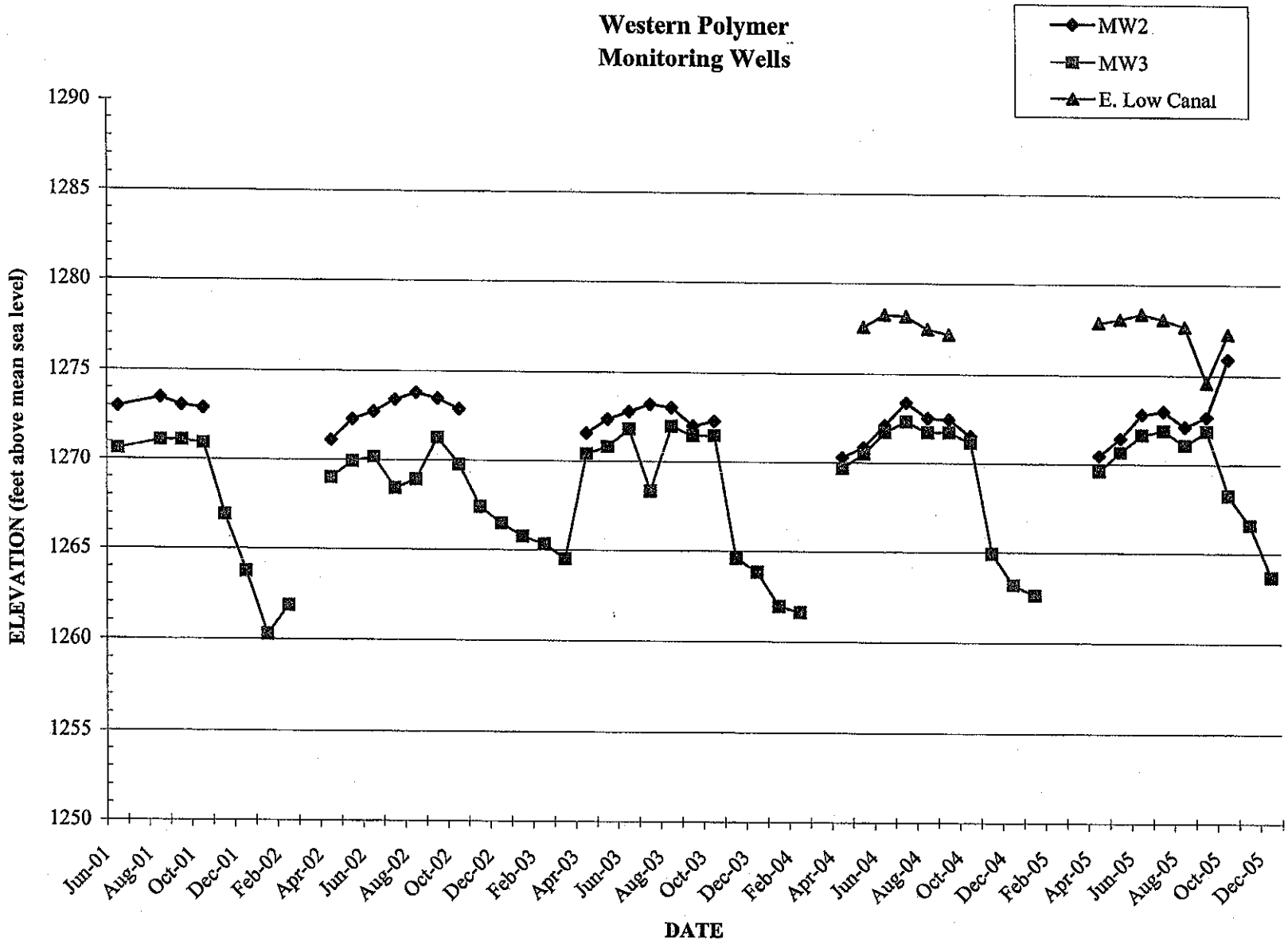

Western Polymer
Monitoring Wells
MW2
MW3
E. Low Canal
ELEVATION (feet above mean sea level)
1290
1285
1280
1275
1270
1265
1260
1255
1250
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
Oct-03
Dec-03
Feb-04
Apr-04
Jun-04
Aug-04
Oct-04
Dec-04
Feb-05
Apr-05
Jun-05
Aug-05
Oct-05
Dec-05
DATE

Figure 4

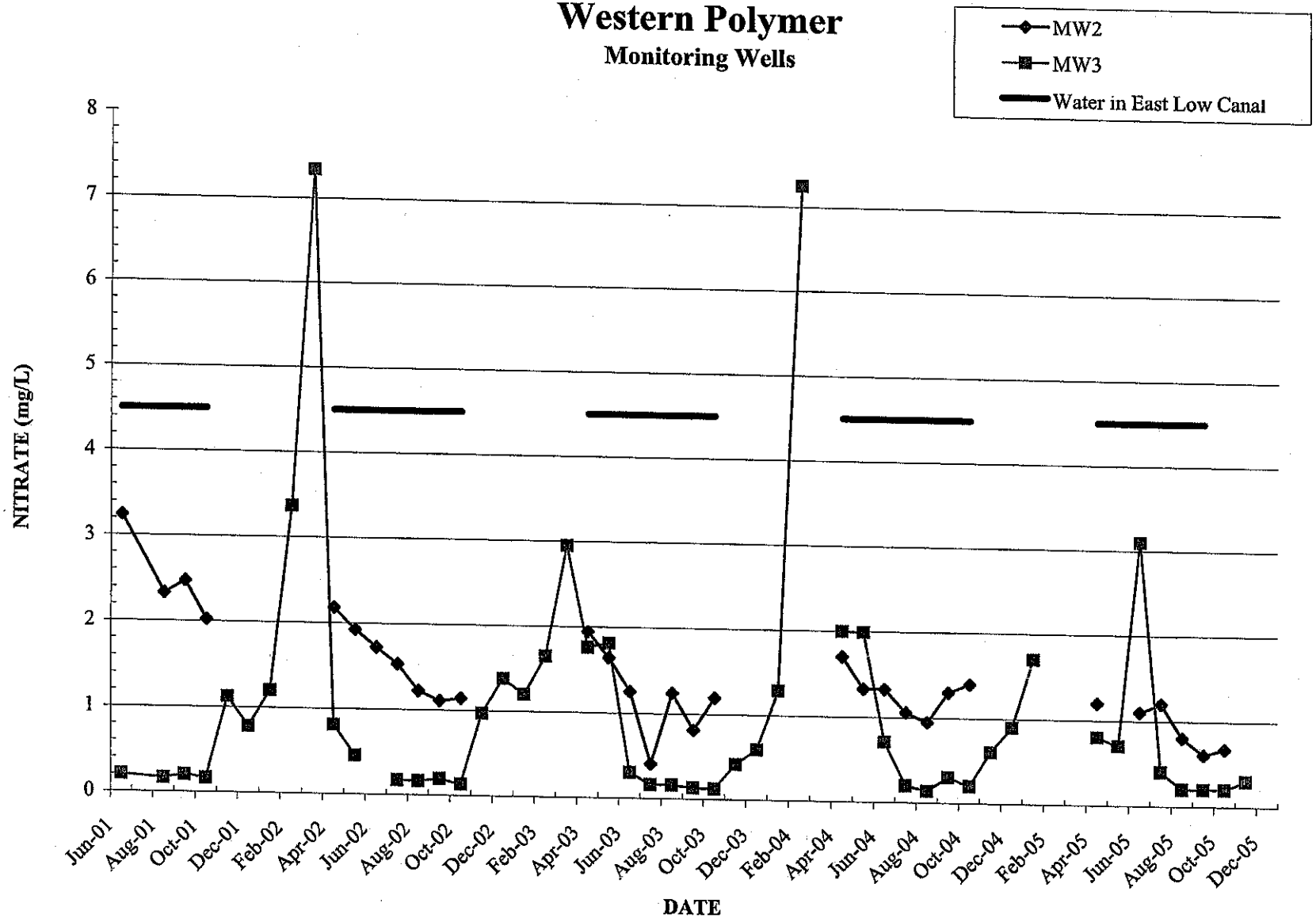
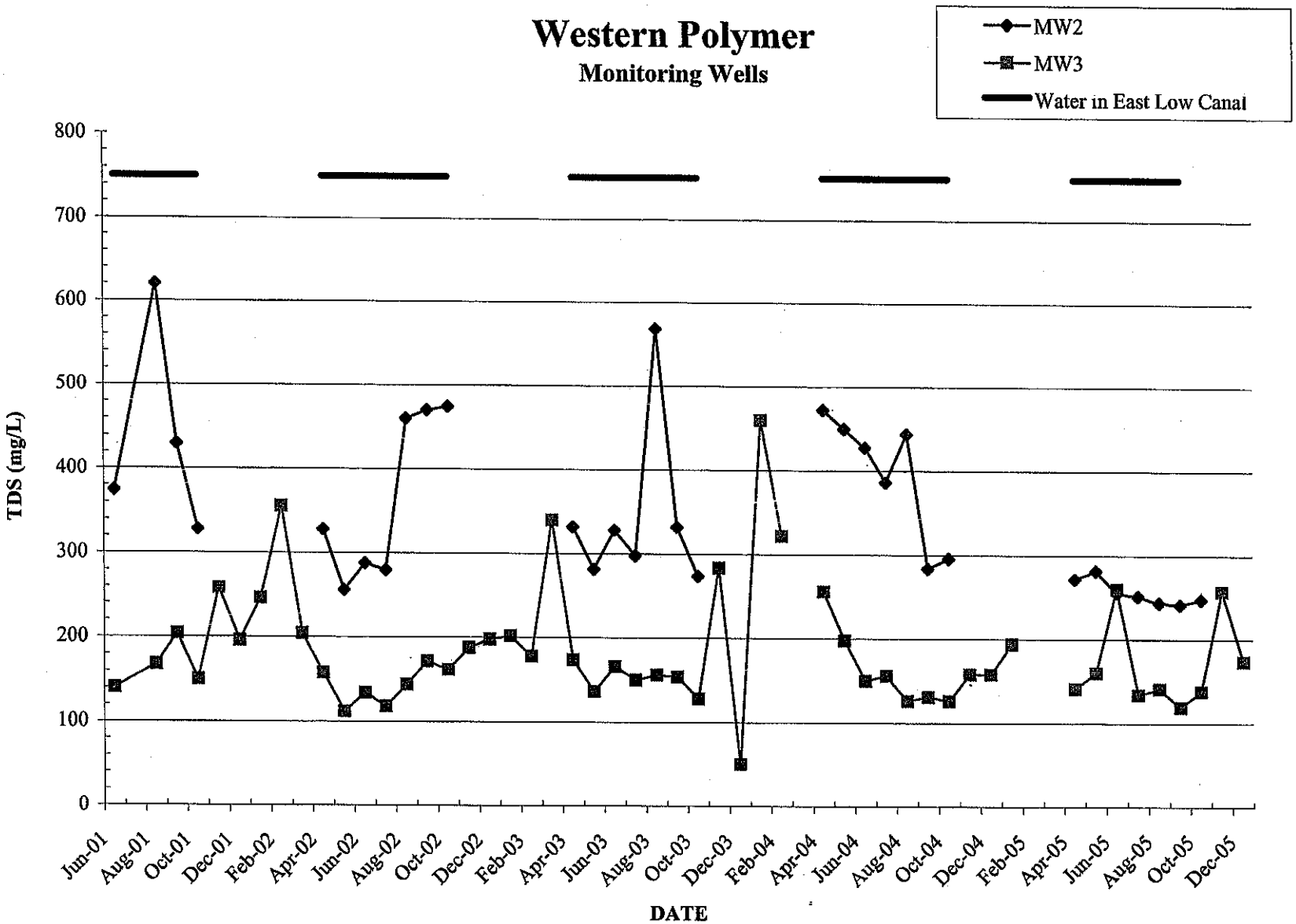
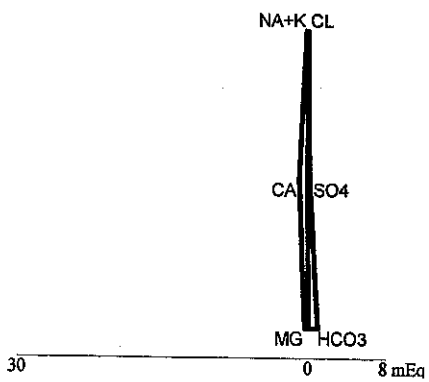

Western Polymer
Monitoring Wells
MW2
MW3
Water in East Low Canal
NITRATE (mg/L)
0
1
2
3
4
5
6
7
8
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
Oct-03
Dec-03
Feb-04
Apr-04
Jun-04
Aug-04
Oct-04
Dec-04
Feb-05
Apr-05
Jun-05
Aug-05
Oct-05
Dec-05
DATE

Figure 5

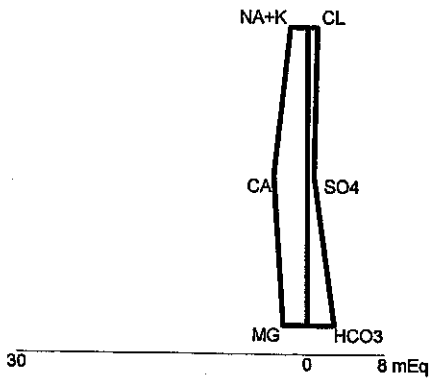

Western Polymer
Monitoring Wells
MW2
MW3
Water in East Low Canal
TDS (mg/L)
800
700
600
500
400
300
200
100
0
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
Oct-03
Dec-03
Feb-04
Apr-04
Jun-04
Aug-04
Oct-04
Dec-04
Feb-05
Apr-05
Jun-05
Aug-05
Oct-05
Dec-05
DATE

STIFF DIAGRAM
01/01/2005

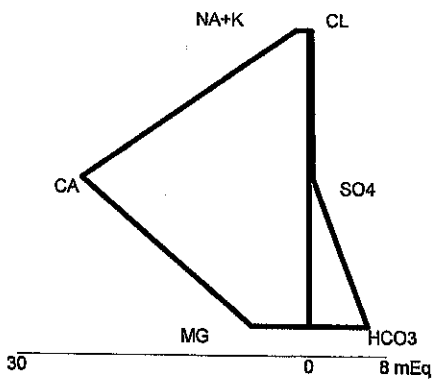
Figure 6



EastLow(u)



MW2(u)

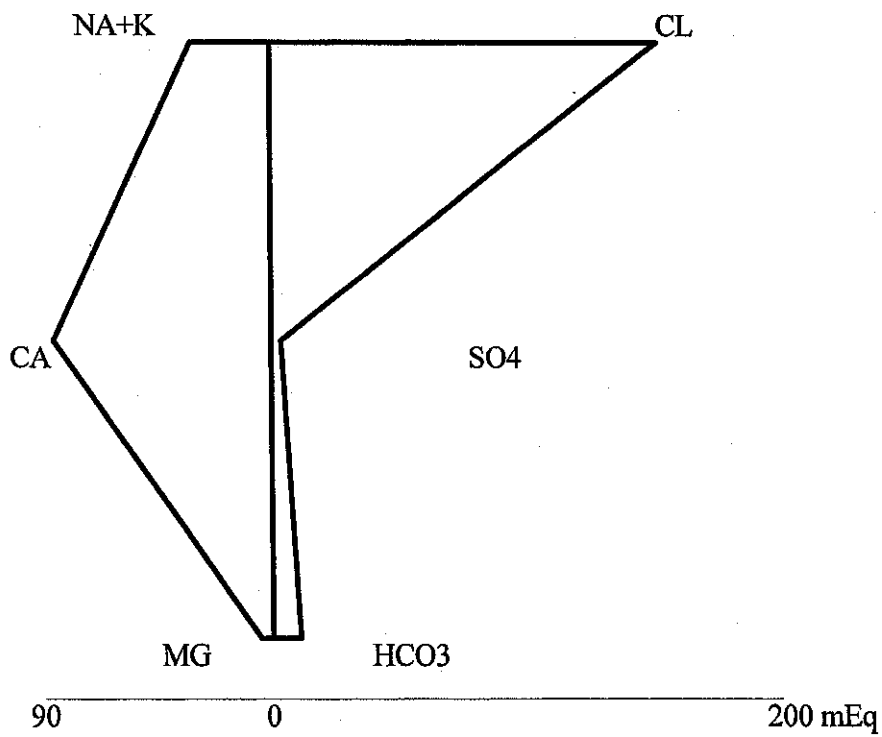


MW3(u)

Constituent: n/a Facility: Discharger Data File: WesternPoly_stiff_diag
Date: 3/1/06, 2:03 PM Client: Regulatory Use Only View: n/a

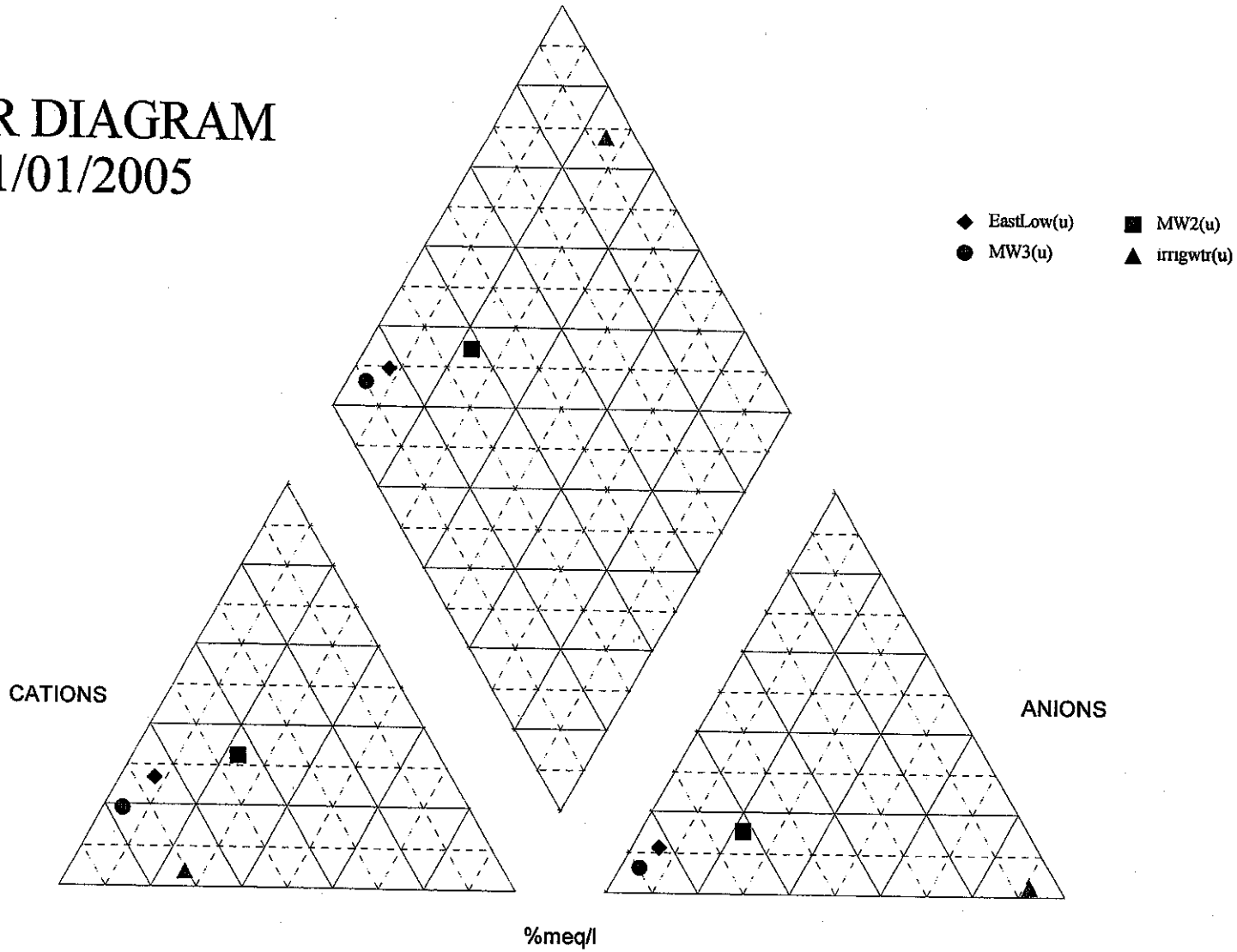
STIFF DIAGRAM
irrigwtr(u) 01/01/2005

Figure 7



Constituent: n/a Facility: Discharger Data File: WesternPoly_stiff_diag
Date: 3/1/06, 2:04 PM Client: Regulatory Use Only View: n/a

PIPER DIAGRAM
01/01/2005



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Date: 5/17/06, 3:52 PM Client: Regulatory Use Only View: n/a

Figure 8

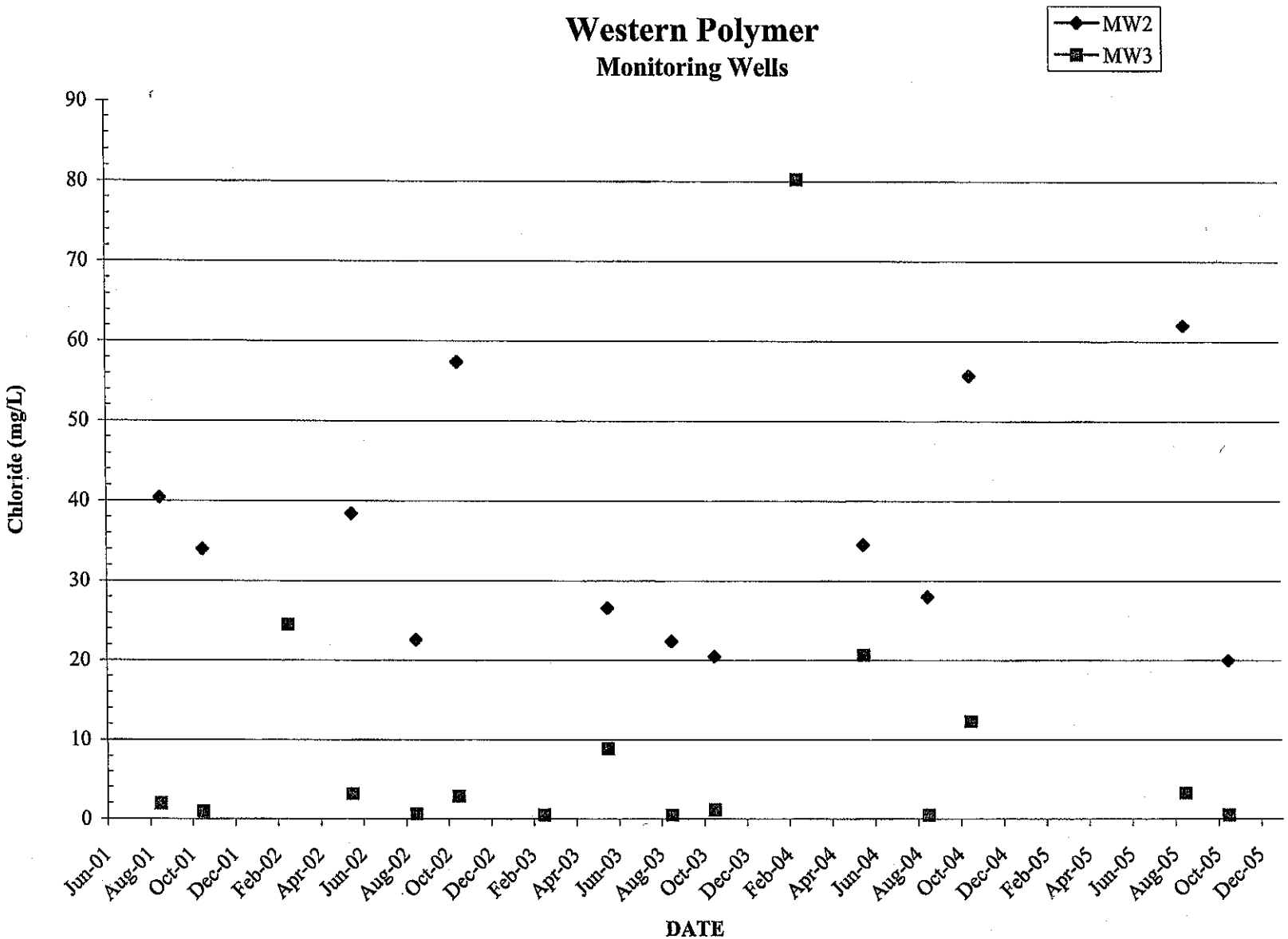
Western Polymer
Monitoring Wells
MW2
MW3
Chloride (mg/L)
90
80
70
60
50
40
30
20
10
0
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
Oct-03
Dec-03
Feb-04
Apr-04
Jun-04
Aug-04
Oct-04
Dec-04
Feb-05
Apr-05
Jun-05
Aug-05
Oct-05
Dec-05
DATE

Figure 9

ADDENDUM

Western Polymer
Net N loading

2000

	Gross w/w load	Comm Fert load	net w/w load	net Comm fert load	Tot net N load		N removal	Balance	
NE	132	0	85.8	0	85 8		0	85.8	
NC	132	0	85.8	0	85.8		0	85.8	
#3	210	0	136.5	0	136.5		483	-346.5	
#4	22	0	14.3	0	14.3		0	14.3	
#4A	88	0	57.2	0	57.2		483	-425.8	
#5A	44	150	28.6	127.5	156.1		326	-169.9	
					89.3	AVG		-126.05	AVG

2001

	Gross w/w load	Comm Fert load	net w/w load	net Comm fert load	Tot net N load		N removal	Balance	
NE	0	122	0	103.7	103.7		334	-230.3	
NC	37	0	24.05	0	24.05		89	-64.95	
#3	71	0	46.15	0	46.15		490	-443 85	
#4	37	160	24.05	136	160.05		334	-173 95	
#4A	70	220	45.5	187	232 5		190	42.5	
#5A	58	215	37.7	182 75	220.45		190	30.45	
					131 2	AVG		-140 02	AVG

2002

	Gross w/w load	Comm Fert load	net w/w load	net Comm fert load	Tot net N load		N removal	Balance	
NE	0	100	0	85	85		101	-16	
NC	0	0	0	0	0		0	0	
#3	66	0	42 9	0	42.9		502	-459.1	
#4	61	100	39 65	85	124 65		162	-37.35	
#4A	47	100	30 55	85	115 55		162	-46.45	
#5A	105	100	68.25	85	153 25		162	-8.75	
					86 9	AVG		-94 608	AVG

2003

	Gross w/w load	Comm Fert load	net w/w load	net Comm fert load	Tot net N load		N removal	Balance	
NE	0	0	0	0	0		0	0	
NC	0	100	0	85	85		106	-21	
#3	70	0	45.5	0	45.5		519	-473.5	
#4	138	100	89.7	85	174.7		169	5.7	
#4A	33	250	21 45	212 5	233.95		308	-74 05	
#5A	21	250	13 65	212.5	226.15		308	-81.85	
					127.6	AVG		-107 45	AVG

2004

	Gross w/w load	Comm Fert load	net w/w load	net Comm fert load	Tot net N load		N removal	Balance	
NE	0	0	0	0	0		0	0	
NC	0	174	0	147 9	147.9		0	147.9	
#3	41	150	26 65	127.5	154 15		308	-153 85	
#4	81	160	52.65	136	188 65		64	124 65	
#4A	183	150	118 95	127 5	246.45		166	80.45	
#5A	267	150	173 55	127 5	301 05		166	135 05	
					173 0	AVG		55 7	AVG

Net w/w load: gross load minus 35% for volatile loss
Net commercial load: gross load minus 15% volatile loss

Western Polymer

TDS/FDS loading

2000

	TDS w/w load	TDS removal	Balance	
NE	10883	0	10883	
NC	10883	0	10883	
#3	17231	1452	15779	
#4	1814	0	1814	
#4A	7255	1452	5803	
#5A	3628	814	2814	
	8616		7996	AVG

2001

	TDS w/w load	TDS removal	Balance	
NE	0	836	-836	
NC	3746	83	3663	
#3	7216	1534	5682	
#4	3746	836	2910	
#4A	7185	165	7020	
#5A	5937	165	5772	
	4638		4035	AVG

2002

	TDS w/w load	TDS removal	Balance	
NE	0	112	-112	
NC	0	0	0	
#3	5049	1672	3377	
#4	4716	115	4601	
#4A	3613	115	3498	
#5A	8084	115	7969	
	3577		3222	AVG

2003

	FDS w/w load	TDS removal	Balance	
NE	0	0	0	
NC	0	118	-118	
#3	4235	1624	2611	
#4	8267	120	8147	
#4A	2010	770	1240	
#5A	1253	770	483	
	2628		2061	AVG

2004

	FDS w/w load	TDS removal	Balance	
NE	0	0	0	
NC	10428	0	10428	
#3	3002	770	2232	
#4	5890	108	5782	
#4A	13,316	124	13192	
#5A	19,447	124	19323	
	8681		8493	AVG

Western Polymer

Monitoring Well 2

	WATER ELEV		NH3 (AS N)		TKN (as N)		NO3 (AS N)		pH		TDS		TEMP	
	FEET		MG/L		MG/L		MG/L		SU		SIN MG/L		SIN °F	
	Value	QLF	Value	QLF	Value	QLF	Value	QLF	Value	QLF	Value	QLF	Value	QLF
Jun-01	1272 98		0 07	F	0 4		3 24		7 77		374		71 8	
Aug-01	1273 48		0 07	F	1 5		2 33		8 05		620		69 4	
Sep-01	1273 06		0 07	F	0 6		2 47		8 05		430		62 4	
Oct-01	1272 9		0 07	F	0 6		2 02		8 31		328		57 38	
Nov-01		L		L		L		L		L		L		L
Dec-01		L		L		L		L		L		L		L
Jan-02		L		L		L		L		L		L		L
Feb-02		L		L		L		L		L		L		L
Mar-02		L		L		L		L		L		L		L
Apr-02	1271 15		0 07	F	0 3	F	2 18		8 24		328		54 9	
May-02	1272 31		0 07	F	0 3	F	1 92		8 13		256		57 7	
Jun-02	1272 73		0 07	F	0 4		1 72		8 11		288		61 7	
Jul-02	1273 4		0 07	F	0 3	F	1 53		8 19		280		67 3	
Aug-02	1273 81		0 58		1 7		1 22		7 98		460		63 7	
Sep-02	1273 48		0 07	F	0 3	F	1 11		8 15		470		68 9	
Oct-02	1272 9		0 09		0 4		1 14		9 19		474		71 96	
Nov-02		L		L		L		L		L		L		L
Dec-02		L		L		L		L		L		L		L
Jan-03		L		L		L		L		L		L		L
Feb-03		L		L		L		L		L		L		L
Mar-03		L		L		L		L		L		L		L
Apr-03	1271 61		0 07	F	0 5		1 94		8 12		332		56	
May-03	1272 4		0 07	F	0 3	F	1 64		8 04		282		72	
Jun-03	1272 81		0 33		1		1 25		7 02		328		73	
Jul-03	1273 23		0 07	F	0 3	F	0 4		8 16		298		75 4	
Aug-03	1273 06		0 07	F	0 3	F	1 24		8 16		568		82	
Sep-03	1272 06		0 07	F	0 3	F	0 81		8 08		332		67	
Oct-03	1272 31		0 08		0 3	F	1 19		7 81		274		62	
Nov-03		L		L		L		L		L		L		L
Dec-03		L		L		L		L		L		L		L
Jan-04		L		L		L		L		L		L		L
Feb-04		L		L		L		L		L		L		L
Mar-04		L		L		L		L		L		L		L
Apr-04	1270 31		0 07	F	0 7		1 7		7 98		472		74	
May-04	1270 9		0 07	F	0 3	F	1 33		8 16		450		74	
Jun-04	1272 15		0 07	F	0 3	F	1 33		8 16		428		60	
Jul-04	1273 4		0 07	F	0 3	F	1 06		7 81		386		66	
Aug-04	1272 56		0 07	F	0 3	F	0 95		8 1		444		70	
Sep-04	1272 48		0 5	F	1 5	F	1 3		8 07		284		66	
Oct-04	1271 56		0 5		2		1 4		8 14		296		62	
Nov-04		L		L		L		L		L		L		L
Dec-04		L		L		L		L		L		L		L
Jan-05		L		L		L		L		L		L		L
Feb-05		L		L		L		L		L		L		L
Mar-05		L		L		L		L		L		L		L
Apr-05	1262 68		0 5	F	1 5	F	1 2		7 86		272		64	
May-05	1271 48		0 5	F	1 5	F		I	7 95		282		72	
Jun-05	1272 81		0 3	F	1 5	F	1 1		7 97		255		64	
Jul-05	1272 98		0 3	F	1 5	F	1 2		8 07		251		66	
Aug-05	1272 15		0 29	F	3 35		0 8		7 91		243		62	
Sep-05	1272 69		0 29	F		E	0 6		8 03		241		67	
Oct-05	1275 9		0 3	F	0 7	F	0 67		7 74		247		61	
Nov-05		L		L		L		L		L		L		L
Dec-05		L		L		L		L		L		L		L
AVG			0 18		0 81		1 42				352			

Qualifier
L = empty
F = less than

Western Polymer
Monitoring Well 2

	BICARBONATE				CARBONATE				CHLORIDE				SULFATE (AS S)			
	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF
Jun-01																
Aug-01	2.03		124		0.56	F	10	F	1.14		40.4		0.89		42.8	
Sep-01																
Oct-01	5.39		329			E	10	F	0.96		34		1.14		54.6	
Nov-01																
Dec-01																
Jan-02																
Feb-02		L		L		L		L		L		L		L		L
Mar-02																
Apr-02																
May-02	2.8		171		10	F	10	F	1.08		38.4		0.83		39.9	
Jun-02																
Jul-02																
Aug-02	2.41		147			E	10	F	0.64		22.6		0.89		42.8	
Sep-02																
Oct-02	3.15		192			S	10	F	1.62		57.4		1.16		55.5	
Nov-02																
Dec-02																
Jan-03																
Feb-03		L		L		L		L		L		L		L		L
Mar-03																
Apr-03																
May-03	4.36		266		0.33	F	10	F	1.03		26.6		0.15		7	
Jun-03																
Jul-03																
Aug-03	2.28		139		0.33	F	10	F	0.63		22.4		0.91		43.8	
Sep-03																
Oct-03	2.85		174		0.33	F	10	F	0.58		20.5		0.7		33.7	
Nov-03																
Dec-03																
Jan-04																
Feb-04		L		L		L		L		L		L		L		L
Mar-04																
Apr-04																
May-04	2.34		143		0.33	F	10	F	0.98		34.6		0.976		46.9	
Jun-04																
Jul-04																
Aug-04	1.97		120		0.4		11.8		0.79		28		0.658		31.6	
Sep-04																
Oct-04	2.46		150		0.1		2.5		1.57		55.7		0.262		12.6	
Nov-04																
Dec-04																
Jan-05																
Feb-05		L		L		L		L		L		L		L		L
Mar-05																
Apr-05																
May-05		E		E		E		E		E		E		E		E
Jun-05																
Jul-05																
Aug-05	2.15		131		0.33	F	10	F	1.75		62		0.183		8.8	
Sep-05																
Oct-05	2.28		139		0.1		3.5		0.56		20		0.202		9.7	
Nov-05																
Dec-05																
AVG			171				9.06				35.6				33.1	

Qualifier
L = empty
F = less than

Western Polymer

Monitoring Well 3

	WATER ELEV		NH3 (AS N)		TKN (as N)		NO3 (AS N)		pH		TDS		TEMP	
	FEET		MG/L		MG/L		MG/L		S.U.		MG/L		°F	
	Value	QLF	Value	QLF	Value	QLF	Value	QLF	Value	QLF	Value	QLF	Value	QLF
Jun-01	1270.6		0.07	F	0.3	F	0.2		8.31		140		71.4	
Aug-01	1271.1		0.07	F	0.9		0.16		8.53		168		66.7	
Sep-01	1271.1		1.5		1.5		0.2		8.53		204		64.2	
Oct-01	1270.93		0.07	F	0.3	F	0.16		8.72		150		59.54	
Nov-01	1266.93		0.07	F	0.3	F	1.12		7.67		258		71.24	
Dec-01	1263.76		0.07	F	0.3	F	0.78		8.37		196		62.42	
Jan-02	1260.26		0.07	F	2.2		1.2		7.57		246		52	
Feb-02	1261.85		0.37		5.3		3.37		7.55		356		53.4	
Mar-02		L	0.07	F	9.1		7.34		7.55		204		55.8	
Apr-02	1269.01		0.07	F	0.3	F	0.81		8.47		158		54.5	
May-02	1269.93		0.07	F	0.3	F	0.45		8.45		112		58.3	
Jun-02	1270.18		0.07	F	0.3			F	8.43		134		62.6	
Jul-02	1268.43		0.07	F	0.4		0.17		8.57		1118		67.8	
Aug-02	1268.93		0.07	F	0.8		0.16		8.41		144		63	
Sep-02	1271.31		0.07	F	0.3	F	0.19		8.47		172		69.8	
Oct-02	1269.77		0.07	F	0.3	F	0.13		8.1		162		71.96	
Nov-02	1267.43		0.7	F	0.7		0.97		8.31		188		64	
Dec-02	1266.51		0.07	H	0.3	F	1.38		8.03		198		64.4	
Jan-03	1265.76		0.88		0.9		1.2		8.46		202		56.84	
Feb-03	1265.35		0.43		2.4		1.65		8.26		178		56.48	
Mar-03	1264.51		0.37		1.7		2.95		8.17		340		62.4	
Apr-03	1270.43		0.07	F	0.3	F	1.76		8.45		174		56	
May-03	1270.85		0.07	F	0.3	F	1.81		5.18		136		72	
Jun-03	1271.85		0.07	F	0.3	F	0.3		7.96		166		73	
Jul-03	1268.35		0.07	F	0.3	F	0.16		8.17		150		70.9	
Aug-03	1272.01		0.07	F	0.3	F	0.16		8.54		156		83	
Sep-03	1271.51		0.07	F	0.3	F	0.13		8.45		154		68	
Oct-03	1271.51		0.1		0.3	F	0.12		63		128		63	
Nov-03	1264.6		0.008		0.3	F	0.41		8.13		284		70.5	
Dec-03	1263.85		0.07	F	0.3	F	0.59		8.45		50		70	
Jan-04	1261.93		0.07	F	5.3		1.29		8.22		460		65	
Feb-04	1261.6		0.25		1.4		7.25		8.01		322		58	
Mar-04		L		L		L		L		L		L		L
Apr-04	1269.68		0.07	F	0.4		2		7.64		256		73	
May-04	1270.51		0.07	F	0.3	F	1.99		8.52		198		73	
Jun-04	1271.76		0.07	F	0.3	F	0.71		8.52		150		59.9	
Jul-04	1272.35		0.07	F	0.3	F	0.2		7.92		156		68	
Aug-04	1271.76		0.07	F	0.3	F	0.14		8.42		126		70	
Sep-04	1271.76		0.5	F	1.6		0.3		8.35		131		67.1	
Oct-04	1271.18		0.6		1.5	F	0.2		8.15		126		66	
Nov-04	1264.93		0.5	F	1.5	F	0.6		8.5		158		66	
Dec-04	1263.18		0.5	F	4		0.9		8.32		158		68	
Jan-05	1262.6		0.5	F	1.5	F	1.7		8.22		194		70	
Feb-05		L		L		L		L		L		L		L
Mar-05		L		L		L		L		L		L		L
Apr-05	1269.6		0.5	F	1.5	F	0.8		8.04		141		63	
May-05	1270.68		0.5	F	1.5	F	0.7		8.19		160		72	
Jun-05	1271.68		0.44		1.5	F	3.1		8.13		260		64	
Jul-05	1271.93		0.3	F	1.5	F	0.4		8.24		134		66	
Aug-05	1271.1		0.29	F	0.65	F	0.2		8.15		141		66	
Sep-05	1271.89		0.29	F		E	0.2		8.19		119		66	
Oct-05	1268.26		0.3	F	0.7	F	0.2		7.97		138		61	
Nov-05	1266.6		0.7		0.07	F	0.3	F	7.95		257		63	
Dec-05	1263.68		0.3	F	1.5			E	8.45		174		62	
AVG			0.25		1.18		1.09				204			

Qualifier
L - empty
F = less than

Western Polymer

Monitoring Well 3

	BICARBONATE				CARBONATE				CHLORIDE				SULFATE (AS S)			
	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF
Jun-01																
Aug-01	1.4		85.5		0.56	F	10	F	0.05		1.9		0.26		12.3	
Sep-01																
Oct-01	2.88		176			E	10	F	0.03		0.9		0.24		11.6	
Nov-01																
Dec-01																
Jan-02																
Feb-02	27.37		1670		1.78		53.3		0.69		24.5		1.83		87.8	
Mar-02																
Apr-02																
May-02	1.6		97.6		10	F	10	F	0.09		3.1		0.36		17.3	
Jun-02																
Jul-02																
Aug-02	1.43		87.2		0.53		15.8		0.02		0.6		0.3		14.6	
Sep-02																
Oct-02	2.18		133			S	10	F	0.08		2.8		0.32		15.4	
Nov-02																
Dec-02																
Jan-03																
Feb-03	24.91		1520		3		89		0.01	F	0.5	F	1.168		56.1	
Mar-03																
Apr-03																
May-03	2		122		0.33		10	F	0.25		8.9		0.344		16.5	
Jun-03																
Jul-03																
Aug-03	1.45		88.3		0.33	F	10	F	0.01	F	0.5	F	0.256		12.3	
Sep-03																
Oct-03	2.1		128		0.33	F	10	F	0.03		1.1		0.171		8.2	
Nov-03																
Dec-03																
Jan-04																
Feb-04	19.83		1210		3.9		116		2.26		80.3		0.587		28.2	
Mar-04																
Apr-04																
May-04	1.54		94.1		0.33	F	10	F	0.58		20.7		0.485		23.3	
Jun-04																
Jul-04																
Aug-04	1.34		81.5		0.5		14.4		0.01	F	0.5	F	0.314		15.1	
Sep-04																
Oct-04	2.13		130		0.1		4.5		0.35		12.3		0.067		3.2	
Nov-04																
Dec-04																
Jan-05																
Feb-05	L		L			L		L	L		L		L		L	
Mar-05																
Apr-05																
May-05	E		E		1.1		34.3		E		E		0.133		6.4	
Jun-05																
Jul-05																
Aug-05	2.51		153		0.33	F	10	F	0.09		3.2		0.06		2.9	
Sep-05																
Oct-05	1.51		92		0.4		11.2		0.01		0.5		0.067		3.2	
Nov-05																
Dec-05																
AVG			367				25.2				10.1				19.7	

Qualifier
L = empty
F = less than
E = analysis not done

Western Polymer

Irrigated Wastewater

	FLOW		pH				TKN (as N)				Ammonia (as N)			
	AVG GPD		MAX S.U		MIN S.U.		LBS/DAY		MG/L		LBS/DAY		MG/L	
	Value	QLF	Value	QLF	Value	QLF	Value	QLF	Value	QLF	Value	QLF	Value	QLF
Jun-01		C		C		C		C		C		C		C
Aug-01	171484		4.79		4.79		205		143		55.7		38 9	
Sep-01	43833		4.6		4.6		39		90.9		16.2		37.7	
Oct-01	117548		5.11		5.11		160		163		30.5		31.1	
Nov-01		C		C		C		C		C		C		C
Dec-01		C		C		C		C		C		C		C
Jan-02		C		C		C		C		C		C		C
Feb-02		C		C		C		C		C		C		C
Mar-02		C		C		C		C		C		C		C
Apr-02	126967		5.2		5.2		150		142		19.2		18 1	
May-02		C		C		C		C		C		C		C
Jun-02	138400		5.16		5.03		179		155		31.5		27 3	
Jul-02	71613		5.42		5.26		81		135		22.7		37 9	
Aug-02	178871		5.65		5.19		234		157		54.2		36.3	
Sep-02	90667		6.81		5.8		120		158		32.5		42.9	
Oct-02	101645		5.24		4.57		129		152		29		34.2	
Nov-02		C		C		C		C		C		C		C
Dec-02		C		C		C		C		C		C		C
Jan-03		C		C		C		C		C		C		C
Feb-03		C		C		C		C		C		C		C
Mar-03	18077		5.13		5 13		20		130		2.5		16.4	
Apr-03	99653		5.41		5.23		118		142		12.6		15 1	
May-03	40613		6.03		5.84		40		119		14.3		42 2	
Jun-03	36367		5 53		5.21		46		150		9.2		30.3	
Jul-03	77871		6.29		5.63		109		167		22.1		34	
Aug-03	252129		5.62		5.2		339		161		106.5		50.6	
Sep-03	165233		6.59		5 18		229		166		37		26.8	
Oct-03	77548		5.36		4 8		98		152		1 4		2 15	
Nov-03		C		C		C		C		C		C		C
Dec-03		C		C		C		C		C		C		C
Jan-04		C		C		C		C		C		C		C
Feb-04		C		C		C		C		C		C		C
Mar-04	35355		6.74		6.74		38.4		130		6.9		23.4	
Apr-04	87233		4.84		4 27		85.9		118		6		8 31	
May-04	2960000		5.98		4.6		84		107		4.2		5.31	
Jun-04	94367		5 31		5.21		107.9		137		13.9		17.6	
Jul-04	52		5 98		5.53		0.1		134		0 01		22 8	
Aug-04	193645		6.16		5.66		219.8		136		44 3		27.4	
Sep-04	59100		6.14		6.14		64.6		131		21.2		43	
Oct-04	321097		5.94		5 76		359 1		134		359 1		134	
Nov-04		C		C		C		C		C		C		C
Dec-04		C		C		C		C		C		C		C
Jan-05		C		C		C		C		C		C		C
Feb-05		C		C		C		C		C		C		C
Mar-05	69677		6.74		4.98		94 5		55		10.2		17 5	
Apr-05	60206		5 32		5 05		68 8		137		7 3		14 5	
May-05	86718		5 05		5		110		152		11 5		15.9	
Jun-05	16		5 34		5 16		0		63		0		86	
Jul-05	20702		5.38		5.38		4.7		27		5.8		33.4	
Aug-05	66391		5.7		5 52		91 4		165		42.1		76	
Sep-05	32378		6.34		6.34		17.2		63 8		6.1		22 5	
Oct-05	393818		6.27		5 55		483 1		147		312.6		95 1	
Nov-05		C		C		C		C		C		C		C
Dec-05		C		C		C		C		C		C		C
AVG							125		131		40 9		35 3	

Qualifier:
C = No Discharge

BOD				FIXED DISSOLVED SOLIDS			
LBS/DAY Value	QLF	MG/L Value	QLF	SIN LBS/DAY Value	QLF	SIN MG/L Value	QLF
	C		C		C		C
4150		2900		16171		11300	
1435		3330		4826		11200	
2737		2790		10300		10500	
	C		C		C		C
	C		C		C		C
	C		C		C		C
	C		C		C		C
	C		C		C		C
2702		2550		8180		7720	
	C		C		C		C
2807		2430		12705		11000	
908		1520		5552		9290	
3523		2360		12360		8280	
2436		3220		6848		9050	
2367		2790		7227		8520	
	C		C		C		C
	C		C		C		C
	C		C		C		C
	C		C		C		C
247		1640		1017		6740	
1547		1860		5264		6330	
529		1560		2596		7660	
801		2640		3460		11400	
1209		1860		7993		12300	
3745		1780		17780		8450	
4095		2970		13376		9700	
1786		2760		5663		8750	
	C		C		C		C
	C		C		C		C
	C		C		C		C
	C		C		C		C
858.6		2910		2779.4		9420	
2169.4		2980		6537.4		8980	
1955.3		2490		7389.4		9410	
2575.2		3270		8820.3		11200	
0.9		1980		3.8		8600	
5526.9		3420		19069.4		11800	
1272		2579		3788.9		7682	
6458		2410		20513		7655	
	C		C		C		C
	C		C		C		C
	C		C		C		C
	C		C		C		C
1405.5		2417			E		E
1745.5		3474		3988.9		7939	
2411.4		3332		6911.3		9550	
0.3		2154		1.1		8729	
523.5		3030		1602.8		9277	
1704.8		3077		5074.6		9159	
237.5		879		780.4		2888	
8903.3		2709		36339.6		11057	
	C		C		C		C
	C		C		C		C
2266		2548		8279		9111	

POTASSIUM				CARBONATE				BICARBONATE				CHLORIDE				SULFATE			
SIN MEQ/L Value	QLF	SIN MG/L Value	QLF	SIN MEQ/L Value	QLF	SIN MG/L Value	QLF	SIN MEQ/L Value	QLF	SIN MG/L Value	QLF	SIN MEQ/L Value	QLF	SIN MG/L Value	QLF	SIN MEQ/L Value	QLF	SIN MG/L Value	QLF
4 5		176		0.56	F	10	F	7 1		433		183 3		6500		1 13		54.1	
4 22		165		0.33	F	10	F	6.67		407		196		6950		1 33		64.1	
	C		C		C		C		C		C		C		C		C		C
	C		C		C		C		C		C		C		C		C		C
4.12		161			E	10	F	903		551		160.5		5690		1 28		61 4	
3 56		139		0.02	F	10	F	4 97		303		199 4		7070		2.6		125	
	C		C		C		C		C		C		C		C		C		C
2.86		112		0.33	F	10	F	8 75		534		108 9		3860		0.15		7	
1 91		74 5		0.33	F	10	F	12 59		768		13 9		792		0.15		7 3	
3 12		122		0.33	F	10	F	0 16	F	10	F	145 3		5150		10 12		486	
	C		C		C		C		C		C		C		C		C		C
3 89		152		0.33	F	10	F	7 6		464		121 57		4310		14 05		675	
5.06		198		0.33	F	10	F	17 37		1060		442.8		15700		1 54		73 9	
3 96		155		3	F	1	F	13 96		852		112 6		3991		9 33		448	
	C		C		C		C		C		C		C		C		C		C
5.14		201			E		E		E		E	106.5		3774		4 96		238	
5.81		227		0.33	F	10	F	22 19		1354		38.9		1380		0.92		44	
6.09		238		0.1	F	3	F	20.47		1249		143 4		5084		0 58		28	
4.17		163		0 54		8.67		85 4		665		152		5404		3 70		178	

Western Polymer
Irrigated Wastewater

	TOTAL PHOS (AS P)		SODIUM				CALCIUM				MAGNESIUM			
	MG/L Value	QLF	SIN MEQ/L Value	QLF	SIN MG/L Value	QLF	SIN MEQ/L Value	QLF	SIN MG/L Value	QLF	SIN MEQ/L Value	QLF	SIN MG/L Value	QLF
Jun-01														
Aug-01	15.5		16.4		378		120.3		2410		4.61		56	
Sep-01														
Oct-01	14.8		17.8		409		147.2		2950		4.77		58	
Nov-01														
Dec-01														
Jan-02														
Feb-02		C		C		C		C		C		C		C
Mar-02														
Apr-02														
May-02		C		C		C		C		C		C		C
Jun-02														
Jul-02														
Aug-02	11.5		18.7		429		117.8		2360		4.67		56.8	
Sep-02														
Oct-02	1.03		20.1		461		0.02	F	0.4	F	4.62		56.1	
Nov-02														
Dec-02														
Jan-03														
Feb-03		C		C		C		C		C		C		C
Mar-03														
Apr-03														
May-03	8.73		12.1		278		58.9		1180		3.5		42.5	
Jun-03														
Jul-03														
Aug-03	2.84		13.3		306		46.7		935		4.91		59.7	
Sep-03														
Oct-03	28.1		19.7		454		132.7		2660		4.95		60.2	
Nov-03														
Dec-03														
Jan-04														
Feb-04		C		C		C		C		C		C		C
Mar-04														
Apr-04														
May-04	18.5		40.7		935		60.4		1210		3.99		48.5	
Jun-04														
Jul-04														
Aug-04	14.9		46.1		1060		37.2		746		4.58		55.6	
Sep-04														
Oct-04	11.1		38.6		887		77.3		1550		4.39		53.3	
Nov-04														
Dec-04														
Jan-05														
Feb-05		C		C		C		C		C		C		C
Mar-05														
Apr-05														
May-05		E	35.2		809		95.3		1910		4.41		53.6	
Jun-05														
Jul-05														
Aug-05	15.2		35.7		820		103.8		2080		5.01		60.9	
Sep-05														
Oct-05	12.6		36.1		830		117.3		2350		5.45		66.2	
Nov-05														
Dec-05														
AVG	12.9		27.0		620		85.8		1719		4.60		56.0	

Qualifier:
C = No Discharge
E = Analysis not done

Western Polymer
East Low Canal

	BICARB				CARBONATE				CHLORIDE				SULFATE (AS S)			
	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF
May-04	0.95		58.1		0.33	F	10	F	0.01	F	0.5	F	0.231		11.1	
Jun-04																
Jul-04	0.92		56.4		0.33	F	10	F	0.01	F	0.5	F	0.254		12.2	
Aug-04																
Sep-04	0.98		60		0.33	F	10	F	0.1		3.4		0.06		2.9	
Oct-04																
Apr-05																
May-05		E		E		E		E		E		E		E		E
Jun-05																
Jul-05	2		59.2		0.16	F	10	F	0.19		6.7		0.067		3.2	
Aug-05																
Sep-05	1.06		64.8		0.01	F	0.3	F	0.04		1.4		0.058		2.8	
Oct-05																
Avg			59.7				8.06				2.5				6.44	

Qualifiers
E = Analysis not done
F = less than

POTASSIUM				CALCIUM				MAGNESIUM				SODIUM			
MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF	MEQ/L Value	QLF	MG/L Value	QLF
0 02		0 93		0.94		18.8		0.38		4 66		0 12		2.7	
0.03		0 98		0 88		17.7		0.38		4 6		0.12		2.66	
0 01		0 2		0.92		18.4		0 37		4 5		0 06		1.8	
0 01		0 3		0 98		19.7		0 39		4 7			E		E
0 003	F	0.14	F	0 98		19 7		0.39		4 7		0 08		1.9	
	E		E	0 98		19.7		0.41		5		0 08		1 9	
		0 51				19				4.69				2 19	